

THE HILL CAVES OF YUCATÁN



MR. CHARLES R. PEASE, JR.
7 Cadwell Road
Bloomfield, Connecticut 06002

THE
HILL-CAVES OF YUCATAN

A SEARCH FOR EVIDENCE OF MAN'S
ANTIQUITY IN THE CAVERNS
OF CENTRAL AMERICA

BEING

AN ACCOUNT OF THE CORWITH EXPEDITION OF THE
DEPARTMENT OF ARCHÆOLOGY AND PALÆ-
ONTOLOGY OF THE UNIVERSITY
OF PENNSYLVANIA

BY

HENRY C. MERCER

CURATOR OF THE MUSEUM OF AMERICAN AND PREHISTORIC ARCHÆOLOGY AT THE
UNIVERSITY OF PENNSYLVANIA, IN CHARGE OF THE EXPEDITION

WITH SEVENTY-FOUR ILLUSTRATIONS

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TO

JOHN WHITE CORWITH,

MY FRIEND AND COMPANION, WHOSE INTELLIGENT GENEROSITY

MADE POSSIBLE THE WORK DESCRIBED IN THESE

PAGES, THIS BOOK

IS

AFFECTIONATELY DEDICATED.

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THE HILL-CAVES OF YUCATAN.

CHAPTER I.

INTRODUCTION.

WHEN we realize that the recent science of Prehistoric Archaeology in Europe has been largely established on the results of explorations made in caves, the wonder is that more work of the kind has not been done in America. After caves were first examined in Germany, England, and France, it became evident that a large proportion of these shelters had been visited by the savage races that came near them in past time. The facts did not show that many, if any, of the cave visitors were, properly speaking, cave-dwellers, who for epochs dwelt permanently in caves, and could not, or would not, build habitations outside, or avoided regions where there were no caves; but the discoveries proved that, at least once in a while, some representatives of all the successive past periods of human culture ventured under the rock arches. When they did, it appeared that they had built fires and cooked in the flames the flesh of animals, having eaten which, they threw the bones about the cave floor; and there these bones, often split to get the marrow, sometimes carved, or ornamented, or rubbed into points, have remained to this day, together with charcoal and ashes, and tools of stone and metal, to prove the underground feast. When the builder of the first fires had abandoned the cave, intervals of time had sometimes succeeded during which the shelter remained unvisited. In many cases dust and leaves had blown in, splinters had fallen from the roof, beds of alluvium had been washed in by freshets, or stalagmite had incrustated the floor, sealing up the human relics below with an envelope of sand, stone, or mud.

Later peoples venturing into the place had been forced by the limit of light and shelter to halt and build fires upon the same

spot. If they took no pains to dig deeply into the ground underfoot, another rubbish layer was formed exactly above the first, but sometimes separated from it by an interbedded partition of non-relic-bearing material.

The visits of still later peoples repeated the process, increasing the number of human rubbish layers already formed, and producing a series of them, with the oldest on the bottom and the latest on top; and these showed, by the kind and make of the implements they contained, by the pedigree of the associated bones of animals, and by their own sequence one above the other, how, when, and in what order man had lived in the past.

To cut down the cave floors, and, when confronted with the sides of the subterranean trench, to study closely the exposed subdivisions, so as to compare them one with another, was to carry back the human story by regular steps into the remote past, and so the European student, descending by culture layers from iron to bronze, from bronze to polished and then to chipped stone, has worked out the framework of most books written upon prehistoric archæology in the last thirty years.

In outer fields of investigation the clues were disjointed and scattered: the buried city, the mound, the lake dwelling, the quarry, excavated severally, failed to tell certainly which, among many sites, was the oldest. But in a cave—formed by nature for man often before he appeared upon the scene, lasting as long as he lasted, and where the halting-ground, limited by rock walls, light and darkness, had remained the same for all visitors—the whole archæological problem was buried in one spot.

Many geological events, as yet but little studied, have left landmarks in caverns that may prescribe new relations of time to the whole subject, and the bones of animals, preserved from frost and weather in the floor deposits, and reaching back into earlier conditions of species, have given a relative date to human remains associated with them that nothing can disprove. Continued investigation has established the fact that of all searching-grounds known to archæology caves best answer the question which lies at the bottom of the science,—namely, the question of sequence, which came first and which next? When and where was the beginning, middle, and end of the story? And it is matter for astonishment that, although in Europe the prehistoric

region has been set in order and classified through such labors as those of Schmerling at Engis, MacEnery and Pengelly at Kent's Hole, and Lartet and Christy in the Somme valley caves, the whole matter in America has gone thus far without any systematic investigation of the sort since Lund, in 1820, supposed he had found human remains mixed with Pleistocene fossils in the Minas Geraes caverns in Brazil.

In the United States the dispute wages over glacial man in the East and the still greater antiquity of the Calaveras skull in the West. It is denied that Koch found arrow-heads associated with the skeleton of a mastodon in the Missouri mud, and that Indian matting and pottery belong to the layer of sloth-bones in the Petit Anse salt-pit in Louisiana. We fancy the bone-carving Eskimo—the descendant of the French Cave-Man—coming to America from Europe across a pre-glacial isthmus in the North Atlantic. We discuss the probability of Asiatics bringing jade to Central America, of Polynesians drifting to Peru in canoes, of Caribs coming over the eastern sea, of Mayas wandering to Africa by way of the sunken "Atlantis;" while, as far as reasonable proof goes, we hardly venture to guess whether the Indian in the eastern United States came there, as the Lenape alleges, about the year 1390, or slowly developed from a palæolithic ancestor in twelve thousand years. Still in the dark as to these simpler questions, ethnology searches for an answering inference in the life and customs of existing savage peoples, while archæology studies mounds, ransacks village-sites and quarries, and photographs ruins, filling museums with the results.

But we are learning that there are caves in Pennsylvania and West Virginia full of a new and valuable evidence, and that the limestone of eastern Tennessee is honey-combed with caverns which contain hearths and midden-heaps to testify to the true relation of peoples and the time of man's first coming to the eastern region.¹ As far as examined this evidence has repeated

¹ See notices of caves explored in Tennessee, Virginia, West Virginia, Illinois, and Kentucky, in *American Naturalist* for April, July, and September, 1894; and "Bulletin of the Department of Archæology of the University of Pennsylvania," for July 4, 1894; also Re-exploration of Hartman Cave, near Stroudsburg, Pennsylvania, in "Proceedings of the Academy of Natural Sciences of Philadelphia," for 1894.

itself and tallied with cave evidence in other parts of the world, so strengthening the inference that all savage peoples everywhere, when confronted with convenient natural shelters, have gone into them and left their trace there, that the question of man's antiquity in eastern North America seems in a fair way of being finally settled.

Two years' study of caves in the Ohio and Tennessee valleys has simplified the inquiry. The topography of the Appalachian region has made it possible to eliminate many shelters from the search and to concentrate attention upon others which, by their position, constitute the key to the situation. As light dawns over the subject the outlook widens, and threads of inquiry lead onward into all parts of North and South America.

Meanwhile, the idea of searching in the caves of Yucatan or Chiapas for what the Germans call *Cultur-schichten* (culture layers), or deposited beds of charcoal and ashes, associated with human relics and denoting epochs of human occupancy, as above explained, had occupied my thoughts since 1890. But there seemed a small chance of seeing this sort of light thrown upon the problem of man's antiquity in Yucatan when it had fallen to my lot in the late autumn of 1894 to search for human traces in the bone cave at Port Kennedy, Montgomery County, Pennsylvania, then for the second time exposed to science by the chance blast of a limestone quarryman. The attention of the Academy of Natural Sciences of Philadelphia had been directed to the spot where a deposit of mud and stones, choking up the cavern, revealed the traces of an animal and plant life that had ended with the advent of modern time. The bones of an unfamiliar race of extinct animals, represented by the sloth, the tapir, horse, and mastodon, had been ground to powder or broken and deposited in stratified beds, and their appearance gave evidence of a flood yet unexplained that had overwhelmed the creatures when their day had come, or whirled in destructive torrents their whitening skeletons. Once for all the contested question of the antiquity of the human race in North America would have been settled at this place had we found in the interbedded layers, forty-five feet below the surface, a jasper chip, arrow-head, hammer-stone, or potsherd to positively connect the fossils with the presence of man. But when snow and frost drove us away

no such trace had been found, and we were obliged to rest content with the new and valuable insight given into the condition of further and more extensive search into American caverns. At Port Kennedy the layer of the sloth and tapir had formed a landmark between cave deposits which were ancient and those which were modern, showing plainly the conditions under which the investigation was to be pushed back into the extreme past. We had clearly gone back one geological step, and in some degree understood how and when those pleistocene layers which we had as yet failed to find in other caves might be searched for and found again.

It was the assistance given by Dr. S. Weir Mitchell to the plan of exploration, and the interest taken by Mr. J. W. Corwith, of Chicago, in the work at Port Kennedy, in November, 1894, that led to the generous offer of the latter to the University of Pennsylvania resulting in an expedition equipped by him for similar research in Yucatan.

The opportunity had come at the right moment. A series of excavations at the Lookout and Nickajack caves in Tennessee, at Hartman's Cave in Pennsylvania, at Thompson's Shelter in Virginia, at Cave-in-Rock in Indiana, and at Lake's Cave in Kentucky had brought us within reach of a solution for the North American problem. The question, illumined by the advice and suggestion of Professor Cope, had become broader, and with an enlarged perspective we were prepared to extend the scale of investigation.

In the short time allowed for consultation and preparation I continually owed warm thanks to the encouraging advice of Dr. S. Weir Mitchell, whose friendly aid had alone made possible the work. My gratitude was also due to the liberal archaeological and practical help given me then as since by Dr. Daniel G. Brinton, and to the energetic co-operation of the President of the Archæological Association of the University, Dr. William Pepper.

Many possibilities were suggested. We might have revisited the caverns of Minas-Geraes in Brazil, where the previous explorations of Lund and Claussen seemed to need revision; we were tempted to turn to an unexplored field in Peru, and review the work done in Mexico. But when Professor Heilprin, of the

Academy of Natural Sciences of Philadelphia, kindly reported that he had seen large, dry caves in a small range of hills in Central Yucatan, our destination was settled. If these caves, as Professor Heilprin informed us, contained aboriginal carvings on their walls, and showed signs of human habitation on their floors, they would by all past experience, and better than speculation from Spanish chronicles, answer the first question we asked, How long had man lived in Yucatan? If they were only easy of entrance, light, and conspicuous, the first immigrants who crossed the mountains must have noticed them, when the halt of one traveller in a thousand, leaving behind him underground a patch of charcoal and ashes, a bead, a flint knife, or a potsherd, would tell the tale, while the position of the subterranean shelters on lines of communication between the ruins of Uxmal and Labna, on the one hand, and Mayapan, Ticul, Mani, and Chichenitza, on the other, would have forced them on the attention of the builders of these cities as they passed from one to another.

Chance had offered us the question in a nutshell. If ever human refuse layers on the floors of caverns were to reveal the conditions of a lost human chronology, such layers might be looked for in these caves, the first group of which existed, as we were told, at Calcehtok, and the second at Tabi, about half-way on a straight line between Uxmal and Ticul.

CHAPTER II.

THE JOURNEY TO YUCATAN.

THE hope of solving this important question by means of evidence easily accessible, but hitherto neglected, and the many chances of a hunt in the subterranean twilight, preoccupied our thoughts as, suddenly equipping an expedition, we packed up provisions, tents, medicines, and instruments, and set out for Yucatan.

Let it be said that with cave-hunting there goes the knowledge that a cave once excavated is probably spoiled for future investigation, that the floors lie always at the mercy of nitre-diggers, "relic"-hunters, or quarrymen, and that other searchers are or may be in the field to anticipate the enterprise by a just priority. In this case we remembered not only that nature often obscures the record of caverns or unfits them for excavation, but that fever, objections by officials and land-owners, or the hostility of Indian guides might upset our calculations at any moment. As we had started late in the short dry time available for exploration, and as we knew that another expedition had reached the Peninsula ahead of us, it may be understood why after a week on shipboard we looked at last at the coast of Yucatan with restless eyes. We lay at anchor in a green sea, where some palm-trees, dim in vapor, rose from the shore. But as the line of white beach was three miles away, it took us nearly twenty minutes in a tender to reach a narrow pier that ran into deep water over the sands. Climbing upon it, we stepped quickly along the tarry planks, and, passing a large building with plastered walls and a reach of sand, came into the main street of Progreso. There a hot air blew along the houses, shaking awnings at the doors of shops, where groups of dark men stood in the shade, and women in white garments sat along the curbstone with bowls of cooked meats. There was a market-place full of fruits and fish, a wooden railway station walled with lattice, and a hotel. But

a glance at the sandy streets and brown faces brought us little more definite than a pleasing, cheerful impression, and it was not until our party of five—Mr. Corwith and myself, with Mr. Darlington (secretary and field assistant), Robert Anderson (assistant), and Frank Hauser (cook)—had taken places in little cane-seated railway-cars and were rolling slowly away from Progreso and the sea that the appearance of the strange land for a time possessed our thoughts.

What was in store for us in the flat country that had the look of a dry swamp, where here and there groups of thirsty cows looked listlessly from the bushes? The boughs were leafless. Upon roads following the track we saw ox-carts with solid wooden wheels, and at dusty thatched stations Indians with trousers rolled up to their thighs, often straining under the weight of heavy baskets supported by straps across their foreheads, stood looking at the train. As the day waned we passed fields of cactus called *henequen* (*Agave sisalensis*), whose fibre, used for rope, is the chief product of Yucatan, while sometimes palm-trees rose against the evening sky, and under dark masses of foliage we had glimpses of walls, gates of stucco, arches and colonnades, beyond which lights glimmered after sunset. By degrees a blue twilight enveloped everything. The thatched huts faded into faint outlines. We could only smell the perfume of fires built of unknown woods, as, sitting by the window, in the warm draught, we looked outward on horizon and sky.

The station-shed at Merida was crowded, and I well remember our three clear impressions of the attractive throng as we stepped into it. Its dress was white. It was conspicuously clean. It was noticeably quiet. At least two-thirds of the faces were brown, and this fact we observed again when, after finding rooms at the Hotel Yucateco, we followed the glimmer of lights to a plaza to watch once more the moving crowd, dressed (save a few men in European clothes) in straw hats, loose muslin sacks, cotton trousers rolled up at the bare ankle, and sandals. The general effect of whiteness was largely due to the costume of the women, the most striking of all the sights we had yet seen. This was invariably white, and fell about their figures in graceful folds. Two little borders of delicate embroidery ran across it, edging the sleeves, which were often rolled up, and a long

fringed scarf of dark blue or purple, covering head and neck, half hid their features. Alone or in groups, but rarely accompanied by men, they hurried past as if upon errands, many of them walking with bare feet. Not all the brown countenances were bewitching nor the figures all straight, but the poetically beautiful dress was a surprise. That effaced every suggestion of the commonplace, monopolizing our attention while the faces went by, darker or lighter, as Spanish blood had tinted them more or less, until for the first time we realized the presence of a strange ancient race. The people whose remains we had come to study had neither perished nor been absorbed by their conquerors.

On the contrary, still comprising more than three-fourths of the three hundred and ninety-three thousand people in the Peninsula, they had rather absorbed the Spaniards, while their language—the language of the hieroglyphs at Palenque and Chichen-itza—had conspicuously held its own. Far from wilting, like their North American cousins, at the touch of civilization, the sturdy, handsome Mayas had turned readily into servants at the haciendas, farmers, small tradesmen, porters, and day laborers. As they had built the ancient ruins, so they still did most of the manual work in a climate where European laborers succumb. They must remember something of their past, but how much no one yet knows. It is doubtful if any modern student has gained their confidence, and certain that a reward must be in store for the archaeologist who, living among them as a brother, masters their language and wins their friendship. But the knowledge we sought lay buried in the ground. We asked one question at least which not even a Maya priest, versed in hieroglyphs and keeper of annals in the time of Montejo, could have answered. What earlier peoples, if any, had preceded the Mayas in Yucatan?

The Spaniards found an ancient city at the site of Merida, the vestiges of which have been removed to build the present walls; and now no temple or door-way or hieroglyphic inscription in its original setting catches the eye anywhere, so that our first glimpse of buildings that appeared old reminded us of Spain, like the gate-way of Governor Montejos' house, built by the conquerors in the sixteenth century. And it was only when we had driven out

of the city that structures entirely characteristic of Yucatan confronted us. These were two of the well-known *cenotes* or subterranean wells where still pools of water, supplied from underground natural reservoirs, covered the floors of small caves about twenty-five feet deep. Walls and gates had been built at their entrances, and stairs cut down to the basins. The moist air grew warmer as we descended upon stone platforms by the tanks, where we could easily see bottom in the shallow water, but noticed no sign of current or quick egress, though we looked carefully for channels along the margin of the pools, in one of which a boy had just been bathing.

There was something oppressive in the region about the wells, where the city had seemed to end suddenly in a thorny, shadeless thicket. I felt the desire of drawing a long breath as I looked in vain for a glimpse of distance, a grassy sward, or an open meadow. Tangled, leafless bushes overhung the loose walls of the roads, and shut out the horizon, proclaiming that we were standing on the verge of the oft-described forest that envelops the Peninsula from Progreso to Guatemala. But we saw, not what we had dreamed of,—a fantastic wilderness of bright colors and strange growths,—but a brown, monotonous waste, a thing of unusual import as we soon knew it, balking the explorer with malevolent power, as it hides what he would find and holds fast what he would take away—always his enemy, bitter, unrelenting, and treacherous.

This was the forest in which other explorers had been forced to travel with pack mules, cut their way through the close underbrush, and pitch tents in the insect-ridden bushes. Luckily for us, we were to work in a subterranean shade, ride in native carts (*volans*) over well-known roads, and lodge in comfortable rooms. Thanks to the kind response of the Bishop of Yucatan to our letter of introduction from Dr. Brinton, the Governor, Don Carlos Peon, Señor Eusebio Escalante, our host at Calcehtok, and Señor Eulogio Duarte, had generously supplied us with notes of recommendation to all the hemp and sugar plantations (*haciendas*) on the line of our expedition, while the more we heard of the mountains, the roads, and the *haciendas*, the easier the enterprise seemed, the caves themselves continuing to promise everything from their position. There were others in the Penin-

sula, but those in the sierra confronting the migration paths of any peoples that might ever have inhabited Yucatan included all the evidence that we could have asked for and all that other caves could have furnished.¹ If the Mayas had been the only ancient inhabitants of Yucatan, the caves would be found to contain but one refuse layer. If other peoples had preceded them, other similar layers, standing for their other respective states of culture and other periods of occupancy, would be encountered deeper in the cave earth as we cut down the floors.

This prospect of a discovery near at hand monopolized our thoughts. There was an opera at Merida, a museum, an evening concert on the square. There were cafés and native markets, religious ceremonies and bull-fights, new friends and promised acquaintances. Less preoccupied, we might have spent a month at the Hotel Yucateco, but three restless days sufficed to equip us with our extra provisions and an Indian cook, and found us on the train for Calcehtok.

A tram-car of the kind used for transporting hemp at the haciendas was waiting for us at the lonely station of San Bernardo, and, leaving the baggage to follow, we jumped aboard a platform furnished with seats and dragged by a single mule. Then we whisked across a level reach into the twilight at a rate that set the wind rushing past our cheeks. For many minutes bushes hemmed us in, and we passed a gate and entered an immense henequen field. Rolling on towards the slope of a low ridge, we passed some thatched huts, turned a sharp corner at a gate, and drew up in the main court of the hacienda. Piles of firewood lay along a low building. We saw a chapel and palm-trees, and near them the arches and columns of a balcony with stone steps. The chapel bell was ringing as, passing a group of dusky men, we came to the veranda and went up the steps where the Indian children were singing their evening prayer. Then, led by the overseer, we took possession of several bare lofty rooms

¹ Stephens saw a blowing cave at Xcokh, near Mani, and other caves at Kewik and Xul, west of Tekax. The large rotunda at the water cavern of Xtacumbilxunaan, near Bolenchen Ticul, would have been probably adapted for excavation, as also the chambers in the cave near a mound at Mayapan. I saw caves along the west side of the railway track near Lapan and Tecoh in the level region.

furnished with hammock pegs. These were our quarters, generously offered us by Señor Escalante for weeks or months as we chose. While Robert Anderson arranged our boxes, bags, and implements on the floor, our cooks, Frank Hauser and Pastor Leal, prepared for supper in a neighboring kitchen.

Outside the scene reminded me of Egypt. Long white walls, arches of stucco, palm trees, swarthy figures in white clothes, and fluttering scarfs seemed to speak only of the Nile. But there was no open desert. The gray forest pressing down from the hill above was strange, and held the key to questions which were above all American. The imported coloring of Arabian Spain, now grown old in the New World, blended softly into its background. Behind all it guarded the secret of grotesque ruins, and worked its enchantment upon the mind of the student of lost tombs and palaces, hieroglyphs, Toltec migrations, and Maya legends colored by Spanish priests.

CHAPTER III.

ACTUN SPUKIL, THE CAVE OF MICE.

WE had expected to encounter a range of mountains at Calcehtok. What we did see was a low ridge, scarcely higher and less broken than the hills in northern New Jersey, or the Lehigh hills at Durham in the Delaware Valley. This was a serious disappointment, for my idea of a conspicuous cave or shelter was of one that, like the awe-inspiring Nickajack in Tennessee, looked out of a perpendicular wall of rock, such as would have compelled a band of foot-travellers to skirt its front in trying to get round it and so forced itself upon their notice. But there were no cliffs in sight, and the caves, which had to be hunted for in the forest, though found on and over the slopes of ridges, opened vertically down into the ground like wells. It soon became evident that the conditions for the formation of cliffs, and hence for the exposure of conspicuous vaulted hollows entered on the level, were absent in the region. The coralline and porous Mesozoic limestone of that part of Yucatan had not been upheaved or faulted, and, save for the waves of the hill ridges, lay as it was deposited. As no important rivers or streams existed,¹ there had been no erosion of valleys and consequent baring of rock walls by running water. Caves, when exposed, had been opened vertically—that is, by the natural weathering down of a level rock surface till a hole in the roof appeared—rather than by erosion working across a passage so that you could go in horizontally.

The result of this was a very striking class of underground chambers from fifty to three hundred and fifty feet in diameter

¹ Stephens saw a surface rill running from an underground reservoir and probably losing itself in one of the surface pools called aguadas at Becanchen, near Peto, but there are no streams marked on Berendt's map north of Lake Chichankanab, near Peto, save the brooks called Kantena, Xelha, Tetzal, and a fourth emptying into the sea opposite Cozumel, a fifth seeming to lose itself in an aguada near Tulum, and a sixth flowing into the northern salt lagoon at San Felipe.

and from fifteen to seventy feet high, more or less brightly lit by round openings in the ceiling ten, twenty, and fifty feet in diameter.

Through these skylights fragments of the original crust had fallen, forming piles of loose stones on the cave floor. When the downfallen accumulations set sufficiently against one side of the orifice, it was easy to walk down their slope, but, as a general rule, a chasm of some feet had to be bridged over in reaching them, either by descending on a rope or clambering down the root of the alamo-tree, which flourished on the brink of most of the skylights, often sending its tendrils to the cave floor. Where the rock pile was high enough, banana-trees and tropical evergreens growing upon it swept the brink of the chasm with their boughs, making strange rattlings when the wind blew. Sometimes the subterranean groves lay far beneath the surface in rotundas inaccessible from above. Then they were first seen after a long clamber underground, like gardens beneath the vaultings of sombre passages. Doves built their nests in high ledges by the skylights, and animals found refuge under the rock heaps, where Indians had built blinds of loose stones to stalk them.

This surprising charm of underground vegetation was in store for us at Actun Spukil¹ (Cave of Mice), the first of the caverns that we visited. It lay on the southwestern slope of the hills, three miles west of Calcehtok. Horses were offered us, but on the rocky, slippery path that led to it we preferred our feet even to the sure-footed little animals who, it was said, slid from rock to rock without falling. The way wound through a thorny thicket across the hills. Stumbling along for half an hour brought us to the summit of the ridge, where we halted for breath and looked backward over the distant plain. It had a vaporious blue color like the sea. But the cool hue, deceitful as a mirage, was one of the illusions of the ever-present forest that enveloped Yucatan,—a low, tangled, terrible thicket, half-leaved then, waterless, and full of thorns and wood-lice. From the Gulf on the north, southward to Chiapas and Belize, and growing denser

¹ *Tun* means rock in Maya, *Ac* to cover or be covered with. The Bishop of Yucatan informed me that little chicken-coops of stone are also called actun by the Indians.

as it crossed the wild region southeast of Lake Peto, it covered everything. Revolted Indians still held out in it against the conquerors. Its summer leafage hid temple walls from the searcher

FIG. 2.



Actun Spukil (Cave of Mice). Banana-trees and underground vegetation in the inner rotunda. Roots of the alamo-tree hang from the skylight.

at a distance of a few feet, and rumor told of ruins buried in it that vied in wonder with those that Waldeck and Stephens described, to the astonishment of the world, half a century ago. Pushing on, we crossed a series of low reaches, with stoneless

red clay underfoot, where long-tailed bluebirds hopped in the leafless tangle. Then the ridge bared again to slope downward, as we left the regular path, and, skirting some clumps of cactus and thorns, heard the rattle of banana-leaves. Presently a palm grove rose out of a sunken amphitheatre at our feet. We had reached the entrance of the cave. Approaching the brink of the chasm and looking down, we found that we were standing on the rim of what was really the round skylight opening into a large cavern. As this hole, produced by the caving in of the rock, was in the middle of the cave ceiling, the abyss shelved inward and downward underfoot on all sides. The high ground on which the banana-trees grew was a heap of downfallen stone and rubbish. Place an egg-shell on its side and, cutting a hole one-fourth its diameter in the circumference uppermost, pour in sand till a conical heap half filling the inside nearly reaches the middle of the orifice, and you have reproduced the conditions of Actun Spukil, and, indeed, that of most of the mountain caves we visited. As there was no place above-ground where the sand had reached the egg-shell in the present instance, the Indians had made a ladder of saplings bound with twigs, and we climbed down to find ourselves in a well-lit underground region that was dry and cool. The hill of rocks, crowned with banana-trees, rose in the centre, and the stony-floored shelter went far inward under the overhanging crusts. Natural arches confronted us, with skylights beyond, down which vines swung and roots, large and small, made their way to the ground. We looked over crags into a deeper chamber, where another grove of banana-trees held their fronds towards the air and light. The black background behind them was the shadow of a passage that led onward into the dark. We stopped often to look and listen. After the echoes of rattling palm-leaves came silences, followed by the sound of dropping water and the chatter of birds. Round about the central rock pile and downward into the deeper rotunda led a sort of path. At some places, where passing bodies had given the rocks a polish, rude steps had been built, and at others the charcoal-blackened ground was scattered with potsherds.¹ These

¹ Whoever has cooked at a camp-fire knows the value of pots and kettles and can understand why potsherds—fragments of broken earthen vessels—are

abundant gray, red, polished and painted fragments were hardly noticed, when blocks of stone two and three feet in diameter and

FIG. 3.



Actun Spukil (Cave of Mice), in the mountains, two miles west of the hacienda of Chalchehtok, Yucatan, four miles from the ruined city of Oxkintok. One of the largest and most beautiful caverns in Yucatan, containing fifty-nine stone water-dishes and many relics of the builders of the neighboring ruins. View from the first rotunda into the second rotunda, showing the effect of the skylight upon vegetation underground. Palm-trees flourish in the cooler air. Alamo-roots reach the cave floor from the brink of the skylight eighty to one hundred feet above.

hollowed in the middle caught our eye. Some were broken, many were set up level on foundations of smaller stones, and

so often found at the sites of habitations of primitive peoples. When an earthen pot is broken, its sherds or pieces, generally valueless to the owner, and almost as indestructible as stone, remain at or near the spot. As clay pots were relatively abundant in the metalless Age of Stone, and as one pot makes many sherds, the potsherds, coarse or fine, large or small, plain or ornamented, fortunately bedded in the charcoal and ash heaps of the prehistoric cook, have an extreme value for the archaeologist. Their make, shape, and decoration often indicate the cultural status of the unchronicled people who made them, and their significant absence at the oldest known sites points to an eventful moment in the human story, when man, for a time ignorant of the art of making vessels of clay, at last discovered it.

some, resting exactly under falling drops, were full of refreshing water. We tried to count them, and, after finding fifteen in the first rotunda, followed a line of them into the other. There,

FIG. 4.



Actun Spukil (Cave of Mice). Wall of loose stones at the entrance of the large chamber leading from the inner rotunda.

behind the banana-trees, in the twilight, where the sound of falling drops echoed, we waited awhile to trace the outlines of a spacious room. Its entrance was blocked with a wall of loose stones, built either by modern Indians in time of revolution or

by their pre-Columbian ancestors. Entering the chamber, we counted forty-six stone water-dishes. Some were half sealed by stalagmite; a few were surrounded by loose, unmortared walls, which I afterwards learned were used by Indians as blinds for shooting doves. One dish was partly glued to its wall by stalagmite. In another, photographed (Fig. 5), the drops fell on that day—January 29, 1895—three to a minute, but, as all the water phenomena of the place might have varied in the rainy season, it would have been unsafe to infer great antiquity for the crusts without prolonged experiment. Near by a small incrustation had formed on the decaying stalk of a fallen banana-tree. The water-dishes, as a rule, with hollows one foot by seven inches in diameter, and often one foot deep, had been worked in blocks of limestone, and, on account of their weight and difficulty of transport, it was reasonable to suppose that they had been made upon the spot. Some of the shallower ones might have been used as mortars for corn-grinding, but one or two of the deeper ones had been cut out of living stalagmite, in inner passages where the drops fell, and it was evident that most of them had been made for the purpose of catching water.

Much of the pottery might have been used for cooking and other purposes, but, when we had followed the broken fragments into several passages, and found pieces not accompanied by traces of fire in wet niches too small to admit a man's body, the inference was that many of the sherds had formed parts of vessels set about at the right places to catch dripping water. (See Fig. 8.)

Our first trench, dug in the smoothest part of the floor of the first rotunda, was begun with an indescribable curiosity, but as we went down, removing the cubic contents of each foot before cutting into the next, a mass of loose stones, growing larger as we proceeded, discouraged us.

The first foot disclosed charcoal and ashes, mixed with potsherds. The latter were of many makes, some highly polished, some coarse and decorated with incisions, some painted with brown and red lines. (See Fig. 7.) There were one or two small bones of animals and a rounded wooden object that suggested some portion of the shaft of a spear or arrow.

The second foot showed beyond doubt that we were cutting

through a layer of rubbish left by man. Native people had halted for some time at the spot and built fires. The potsherds found were less varied in make than before. Many of them were red and highly polished, and we found along with the meta-

FIG. 5.



Actun Spukil (Cave of Mice), two miles west of the hacienda of Calcehtok, Yucatan. Stone water-dishes on the floor of the large chamber leading off the second or inner rotunda. Masses of limestone, two to three feet in longest diameter, fallen from the cave roof have been artificially hollowed for catching water when placed under dripping stalactites. The specimens in the photograph have been thickly covered with stalagmitic crust since they were made. Dishes like these were found by us in nearly every cave examined in Yucatan. Many are broken. Many may have been recently moved in range of the present dropping. Some may have been carved by Indians since the conquest. Though made on the spot, we found no trace of the stone cutting tools used to make them in any of the caves.

podial bone of a medium-sized deer¹ one hammer-stone of quartzite, or hard limestone.

In the third foot the pottery was plainer in style. A broken stalagmite and a hard white nodule with battered edges had been

¹ All the bones hereafter referred to have been kindly identified by Professor E. D. Cope.

used as hammers. There were no arrow-heads or spear-points, or even flakes of hornstone. The reddish cave dust through which we were digging was full of stones and blackened with charcoal.

In the fourth foot the stones grew thicker. Much pottery had slipped down through their crevices, and no importance could be attached to the depth of any object found. As the larger fallen masses had grown too heavy to remove without blasting, the place had become impracticable with our present resources, and we stopped work at a depth of four and a half feet. The trench, now twelve feet long and seven feet wide, had clearly exposed three subdivisions, beginning at the top.

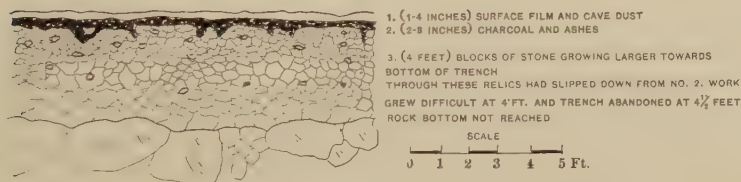
Layer 1.—One to four inches thick ; cave dust recently accumulated, with potsherds.

Layer 2.—Two to three inches ; an undisturbed bed of charcoal and ashes, with potsherds, as described.

Layer 3.—Four feet thick to bottom of trench ; a mass of loose stones, mingled with charcoal, ashes, and downslidden potsherds. (See Fig. 6.)

It was plain that we had not reached the solid bottom of the cave, and, though we had passed through one layer of human

FIG. 6.



Old refuse layer, proving the visits of man to Actun Spukil (Cave of Mice). Face of trench cut into the cave floor without reaching bottom, February, 1895. The time of the building of the present ruins in eastern Yucatan is believed to be indicated by the contents of Layers 2 and 3. Bone of deer found in Layer 3 (second foot).

refuse at the top, we feared that another and deeper layer might exist at an unknown depth underfoot. Turning away in disappointment, we hastened to the second rotunda, where, on the floor of the dark chamber above mentioned, and near a group of stone water-dishes, we began a round hole, six to seven feet in diameter, on the blackest part of the cave floor. Here, again, a mass of loose stones decided us to desist at a depth of two feet, though

the first foot had disclosed a fine assortment of potsherds, a stone arrow-head, a hornstone chip, an obsidian knife flake, and a crys-

FIG. 7.



Actun Spukil (Cave of Mice). Native carving representing an ape's head on a mass of limestone protruding from the floor of a large chamber leading from the inner rotunda. Twenty-nine stone water-dishes lie near. The surrounding earth is scattered with potsherds and mixed with charcoal.

tal of soft, translucent mineral. (See Fig. 8.) Two subdivisions of the deposit were exposed.

Layer 1.—Three inches thick; a hard-caked bed of charcoal and ashes, containing potsherds, and the probable origin of all the objects found.

Layer 2.—One foot nine inches thick; a mass of limestone fragments and cave mould, through the crevices of which objects like those found above had fallen.

The results of our digging had been vexatious. Probably the cavern contained the evidence we sought, but the difficulty of excavation and the doubts that arose from the down-faulting of layers through beds of loose stones seemed to place the whole truth out of our reach. Rather than lose time in a laborious attempt to blast through obstructions to the limestone floor, we decided to turn away and try another cave.

FIG. 8.



From *Actum Spukil*. Specimens of polsherns and other objects found on the surface and in Trenches 1 and 2. No trace of inferiority in the ware as we go downward.

For a while longer we wandered about the place which had withheld its secret from us. Passing by a second bulwark of loose stones at the lower end of the great room, we photographed by flash-light the walls of fantastic passages that led onward into the unknown. Then we took a last look at the marvel of underground trees and hanging roots, and the floor tokens about us, where one of the rocks (see Fig. 7), covered with a green mould, had been plainly carved into the shape of an ape's head.

CHAPTER IV.

WET CAVES IN A DRY LAND.

CELEBRATED caverns like the Mammoth Cave, or the Grotto at Adelsberg in Illyria, or that called the Wyandotte in southern Indiana, do not impress the traveller at their entrance or gain in sublimity through the ingress of daylight. I had imagined the only beauty of caves visible without candles or electric lights to be in the vastness of vaults seen at the entrance, as at the Nickajack in Tennessee, or where you look outward from the shadow upon the Danube through a festoon of vines and leaves, as at the Cavern of Bats in Hungary. Once step inside and the tints of nature bleach into a dull gray or white, imperfectly seen by artificial means; but in these windowed caves slow-moving rays glowed on weather-tinted forms of stone, and each plant or tree grew from the floor in full view. Our first sight of marvels like this at Actun Spukil made a deep impression, but a wonder more awe-inspiring was in store for us at Actun Ceh (Deer Cave), about two and a half leagues westward in the mountains from Opichen. To get to it on February 12, 1895, after a hot walk, we had to climb down a passage littered with loose rocks. The opening chambers grew darker and the vaults higher as we descended, till the fantastic outlines ahead began to catch the inward glimmer of a light that came from a small opening between stalagmitic columns. To reach it we crossed several slopes of crust, and while some of our companions from Opichen, stepping lightly on sandals, slipped through the gray portal ahead, we followed listlessly with the Indians. We had been walking in the mid-day sun, after spending half the hot morning in trying to get a cart and mule in the village, and the first appearance of the cave, whose floors were clearly unfit for excavation, had disappointed us. But the sight of the subterranean chasm ahead stirred us like a burst of noble music. We had entered an immense underground room by its cornice and were peeping down. The quiet

light fell from above as in a painter's studio, yet, as we watched its marvellous effect on the icicles of stone, we could not see the window. Stalagmites rose from the floor in receding tiers, and had the look of muffled human figures gazing upon the amphi-

FIG. 9.



Actun Ceh (Benado), Cave of the Deer.

theatre below. There was no sound of dropping water or chatter of birds, but unseen boughs rustled above, and the voices of the Indians made loud echoes. When we had descended to the bottom we found a stony floor, directly under the skylight, about ninety feet in diameter, where, on neighboring masses of white stalagmite, our guides pointed to dimly-carved outlines of human faces and the forms of animals. We had heard of the carvings in Opichen, and the accounts of friends had led us to expect hieroglyphs, or decorative conventional figures, in the style of the mural designs at Uxmal and Palenque. What we saw were random, sketchy figures, many of which suggested pictographs of North American Indians. With a few exceptions, there was little of the mannerism of Yucatan about them, and if they had

inscribed a cliff-side on the Susquehanna or Ohio, few of them would have seemed out of place. A round knob had been marked with scorings for eyes, nose, and mouth, and just below it dots for the same features had been set inside the rude outline of a head. We photographed several of these groups of dots on the side of a rock near animal sketches (see Fig. 10) that re-

FIG. 10.



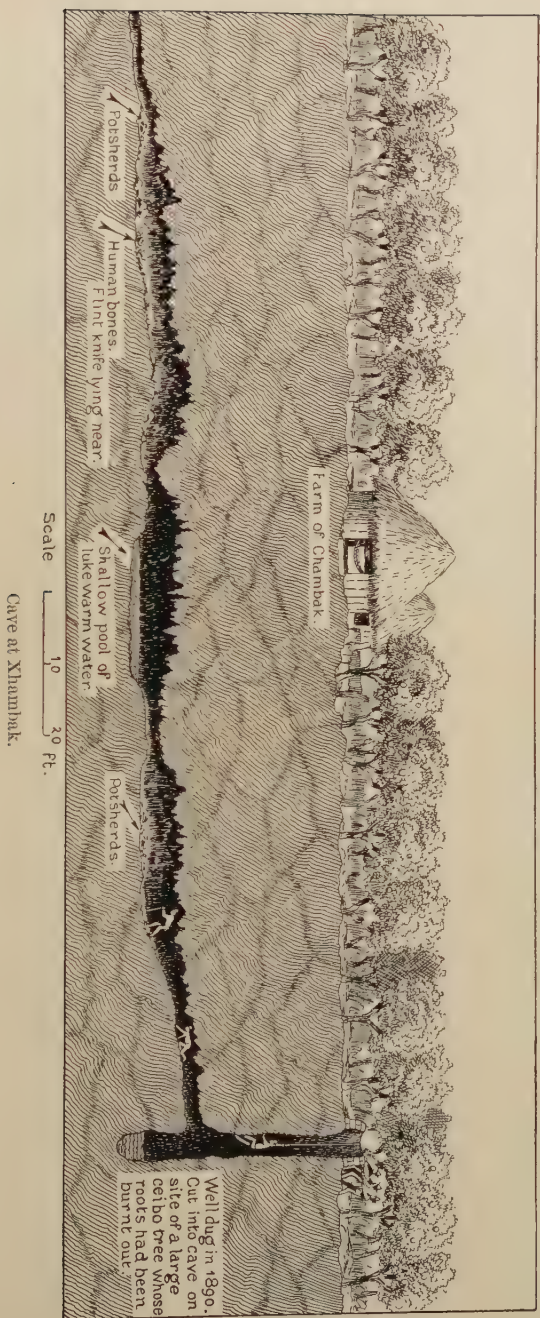
Carvings on the cave wall of Actun Ceh.

sembled deer and may have given the cave its present name. Some of the figures were heart-shaped, and three, at least, suggested hieroglyphic forms. Some had been partly obscured by stalagmitic films since they were made.

There was no water in the cave, and the stalactites were dry, though their formation may have been resumed in the rainy season. We found no passages leading on out of the room in which we stood, and saw no marks of fire or potsherds upon the floor. Inaccessible as the cave was, and devoid of water for part of the year as it must have been, we had little reason to hope that it contained all or a considerable portion of the evidence we sought, and, a second time disappointed, we went away.

Our reconnoitring thus far had failed to give us a perspective of the kind of work ahead, but the conditions of Actun Ceh made

FIG. 11.



clearer to us at least one subdivision of the subject, and it seemed important to bear in mind the fact that some caves went dry in the dry season, and that others dripped water all the year round. We learned afterwards of caves which were cool and caves which were hot ; of blowing caves that sent gusts of air from their narrow entrances, like the Lookout Cave in Tennessee ; of caves with skylights, and caves without ; of caves which were animal dens, and of those which appeared inaccessible to larger beasts ; and, finally, of caves which furnished water drop by drop from stalactites, and those in which long, dark passages led to underground reservoirs supplied from below. The hot galleries at Xhambak (Little Bone), one of the outlying farms of the hacienda of Calcehtok, belonged to the latter class. These were discovered in 1890, by the engineer, Mr. Purcell, when a large *sicbo*-tree growing on the farm had been cut down, and the hole produced by burning out its roots had suggested the digging of a necessary well. Though the surrounding surface exposed a ledge of solid rock, Mr. Purcell's shaft descended through a pocket of loose rubble, and at a depth of about twenty feet, and just before reaching water, cut into a small horizontal passage. This led into a larger cave, where one or two individuals had reported discovering a row of skeletons, placed in order, with mortuary vases. To reach the place, we drove in a *volan* about five miles, in a southeast direction from Calcehtok, and, unloading our candles and coil of rope, approached the small cemented opening of the well. The boards of the floor were taken up, and, tying the rope around my waist, while the others held firm hold of its end, I descended in my stockings, with knees propped against the opposing walls, like a chimney-sweep. Just above the water my feet caught the passage, where, clambering in and lighting my candle, I crawled forward over a wet rock floor into several broad chambers, none of which were quite high enough to permit standing upright. Very little cave earth had collected underfoot, and in two places I walked through broad pools of tepid water a few inches deep. The heat had become intense, as, crouching in the candle-light and soaked with perspiration, I could see the floor strewn with potsherds, but looked in vain for the skeletons laid in rows or the arranged vases that would have proved the place to be a burial-cave. At last, at two or three spots I found piles

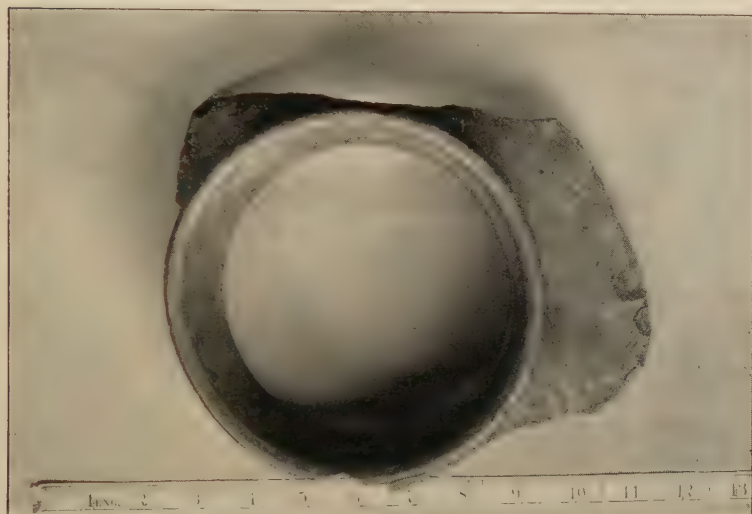
of small fragments of human bones, the remains of possibly five or six individuals, which showed no signs of burning, and could not have been buried. They did not penetrate the ground, as we learned on digging under them, but rested on the surface, and may have been considerably broken and scattered in 1890, when the cave was discovered. Some of the potsherds lying near were large and heavy-rimmed, many were coarse and decorated with scratchings, and close to several of them and but a few feet from the bones we found a thin, leaf-shaped blade of hornstone, broken on one side and about three inches long. But the human relics discovered formed but a thin sprinkling on the surface. The cave was too dark, too narrow, too hot, and perhaps too hard to find in the first place to have permitted refuse beds to grow from the long haltings of men at one spot on its floor. All that we saw was explained by the presence of the water. No intention of continued burial on the part of the cave visitors could be inferred from the human bones, while the other remains indicated the comings of men who wanted water, and hence would not have polluted the supply with corpses. Much as the cave had been visited in ancient times, the present Indians had been ignorant of its important water supply before 1890, and, as the passage originally encountered by Mr. Purcell did not cut across the well and continue on the other side, the inference was that he had either chanced on the extreme end of the cave or had followed down an original entrance, which had been purposely sealed up at the spot. There would have been adequate motive for closing the galleries or injuring the water by burial at the time of the Spanish conquest or during previous civil wars, when a few bodies might have been safely hidden by conquered peoples at the abandoned reservoir. But no trace of the white man was found on the floor. The flint knife lay on the surface. The rims of water-vessels found showed the ancient shape rather than the narrow-necked form now carried to the wells by Indian women, and it seemed reasonable to suppose that all objects gathered in the stifling passages were pre-Columbian.

On climbing up, wet, soot-grimed, and covered with mud from this steaming hole, the warm upper air seemed deliciously cool. Oranges, shaken from the trees near by, were the best cure for our tantalizing thirst, unquenched by draughts of lukewarm

water at the farm, or by corn paste mixed with water offered to us by the Indians in calabashes.

After these days, next to imagined flagons of cold beer, the ideal of refreshment was to stand stripped under a gushing spigot

FIG. 12.



Rim of ancient water-jar; brownish-yellow. Xhambak. Found on surface.

behind the chapel at Calcehtok. In a room close by I slept on a pile of henequen fibre, covered with a straw mat, leaving the doors open at bedtime, to listen to the lulling sound of crickets, or watch the ghostly flutterings of large gray moths which flew in at candle-light. To guard against roving pigs I laid chairs sidewise across the threshold, since the night when one of the "razor-backed" species snorted loud enough to wake me, as, advancing slowly into the room, he gave a series of powerful neck-movements that threatened a complete upheaval of myself, bed, and bedding.

Outside of our work in the caves a sort of languid stupor, caused by the climate, seemed to have taken possession of us. The dress and habits of the people and unusual incidents that often happened passed as in a dream. Novel as were our surroundings at the hacienda, we made no careful observation of them. The work and its exciting chances monopolized the day,

and when we came home tired and sleepy in the evening, the charge of note-books, photographic plates, and labels absorbed our thoughts. There was little time to talk over the after-supper cigar, while sandalled Indians, dressed in white, stepped about to bring oranges and bananas from the garden, spread a bed, set a table, or carry water in earthen vases. The morning start busied us with preparations and vexed us with delays. Little was the use of trying to hurry the *volan* by packing the tools and lunch into it at the appointed moment. No one knew where the mules were till, after half an hour's wait, a man with a rope spent twenty minutes lassoing them in the cattle-yard. When the driver had brought them to the cart, tied them to the wheels, gone home, returned again, and leisurely rolled his cigarette before harnessing the animals, our tempers were spoiled, and the continued experience decided us to give up *volans* and go to the caves afoot. Then two and sometimes three Indians, at sixty cents a day, accompanied us. They wore stiff and heavy broad-brimmed straw hats, a thin sack of muslin buttoning close to the neck, and cotton trousers rolled up to the thighs, leaving the legs bare. Their sandals were tied between the toes and across the instep with harsh thongs of hemp.¹ Large round baskets balanced on their backs by straps across their foreheads carried all our outfit. Leaning forward to support these, and holding shovels and pickaxes in their hands, they walked fast, rarely stopping, except to shake sand from their sandals by tapping the soles.

The difficulty with downfallen masses of rock confronted us again at Sayab Actun, to find which cave several citizens of Opichen kindly volunteered to lead the way through the bushes to a steep slope three miles west of the town. We were in a shallow valley behind the hill-tops, and had to cut through a tangle of thorns with flax-knives to see an arch about twenty-one feet high, that led downward into the ridge and promised us shade and a cool drink of water, if nothing more. Inside, the expanding passage, thirty feet broad, looked light, dry, and

¹ To prove that the ancient Mayas wore sandals of this general pattern, the Bishop of Yucatan afterwards showed me the foot of an earthen statue moulded to plainly show a sandal fastened from the instep by two thongs between the first and second and the third and fourth toes.

comfortable. A large heap of fallen rocks lay upon the floor, behind which galleries ran inward between bristling stalactites. Drip water had collected in natural basins, and several water-

FIG. 13.



Sayab Actun, in the hills three miles west of Opichen, Yucatan, showing our trench cut into the cave floor till large masses of downfallen rock were reached, exposing a refuse layer with ash bands and potsherds, proving visits of man to the cave. Water drips in the background.

dishes lay near the entrance, with potsherds and charcoal. Close to them and in the clear daylight our trench, eight feet long and five feet wide, gave the following results :

The first foot revealed traces of fire on the surface, with pottery, the bones of the deer, bat, and peccary, and a shell of *Orthalicus princeps*. None of the abundant potsherds were painted, though some were decorated with scratches. Certain of the small fragments of animal bones had been split for marrow. We found

FIG. 14.



Fragments of horse-teeth, probably indicating European contact, found associated with potsherds and human refuse in the floor deposits of Sayab Actun and Actun Lara.

one flake of hornstone, several nuts, and two horses' teeth (see Fig. 14) that had probably worked down from the surface in recent time. Digging was easy in the soft cave earth, which contained few stones.

The second foot showed more bones, but the pottery was rarer.

We encountered a dark streak of charcoal and ashes, below which, under a fine red cave earth, the rocks began to slope inward and choke up the bottom of the trench, until our hopes of a satisfactory result were again disappointed. In the *third foot*, just below a second streak of charcoal, the relics, among which we found the bones of a deer, became rarer still, and two solid ledges trended close together, leaving only a small crevice between. The layers exposed were as follows, beginning at the top :

FIG. 15.



Layer 1 (one foot three inches) was composed of soft cave earth containing potsherds and bones. On its surface rested the remains of a hearth.

Layer 2 (two to three inches) was a band of charcoal and ashes containing bones and potsherds.

Layer 3 (nine inches) was composed of soft, red cave earth in which the bones and potsherds had become rarer.

Layer 4 (one and a half to two inches) consisted in a lower band of charcoal and ashes with a few potsherds.

Layer 5 (one foot) showed red cave earth with a few scattered potsherds.

Evidently we had not reached the original bottom of the cave. One at least of the heavy masses which trended together under our feet must have fallen from the ceiling, like the loose fragments above ground on the floor. Judging by the size and number of these, several sections of the roof had broken off since the cave was formed, though to what extent they had filled the original orifice could not be learned without blasting. As long as they remained where they were, we could not be certain that we were in possession of all the evidence, since other human layers, deposited before these masses fell, might rest under them. Here again exploration was obstructed, as it is obstructed in many another cave. What appears to be the bottom of the cavity may be only the hard ringing surface of a fallen block.

But considerations more serious than those of long delays and dangerous blastings had forced themselves upon us by this time, and threatened defeat to the main object of the expedition. The caves we had examined were by no means conspicuous. To reach some of them our Indians had to search carefully, and sometimes cut paths through the tangled thicket, while the fact that many were to be entered only by ladders might well have ruled them out of the explorer's consideration in other countries. Though most of them had contained human rubbish, it seemed unlikely that in any case this rubbish represented the whole record. Remote and hidden as they were, wandering savages and migrating peoples might have crossed and recrossed the mountains without seeing them. Judging them, therefore, as the student might judge caves in the United States, we were inclined to be disappointed with the whole series. For a time our expedition seemed to have lost all chance of success, until an important consideration not only restored to the caves all their archaeological value, but seemed to advance their significance above that of any others I had ever visited. The consideration lay in the meaning of the familiar and oft-repeated word "*agua*" (water). The trouble with northern Yucatan is in the ever-suggested want of water. As far as the surface is concerned, the region is almost waterless. A few surface pools or ponds, called *aguadas* or *sartenejas*, caught after the rains upon mud deposits or in shady rock hollows, such as those at Macoba, near Iturbide, at Zaccacal, and

at Uxmal,¹ remain stagnating through the dry season to support birds, animals, and men, and there may be other reservoirs open to the sky, such as the two celebrated ones at Chichenitza, supplied from subterranean sources.² Berendt's map marks six little watercourses along the coast, but except the rill at Bechanen,³ south of Tekax, I have learned of no interior spring or brook, much less of a river.

The fresh-water flora and fauna of large flowing streams, together with the phenomena of island-making and bank-washing, must be eliminated from the economy of northern Yucatan. Whoever wants water must, generally speaking, go underground for it, whether by blasting a well through solid rock for his steam pump, or searching in subterranean passages, where water drips, flows, or rests in pools. As our Indians filled their calabashes with scrupulous care at every well, for fear of waterless halting-places on the journey, and as we heard the word "*agua*" repeated from morning till night at the haciendas, an idea of the need of water, never realized before, grew upon us. Much of the earliest archaeology of the country seemed to depend upon the question of what the first-comer did, before wells were dug and cities and cisterns built, to get water. As original immigrants, coming in the dry season, could not have found a satisfactory supply on the surface, it is certain that they must have discovered and ransacked the caves, and this fact gave the wet underground passages a new meaning. No matter how remote they were, no

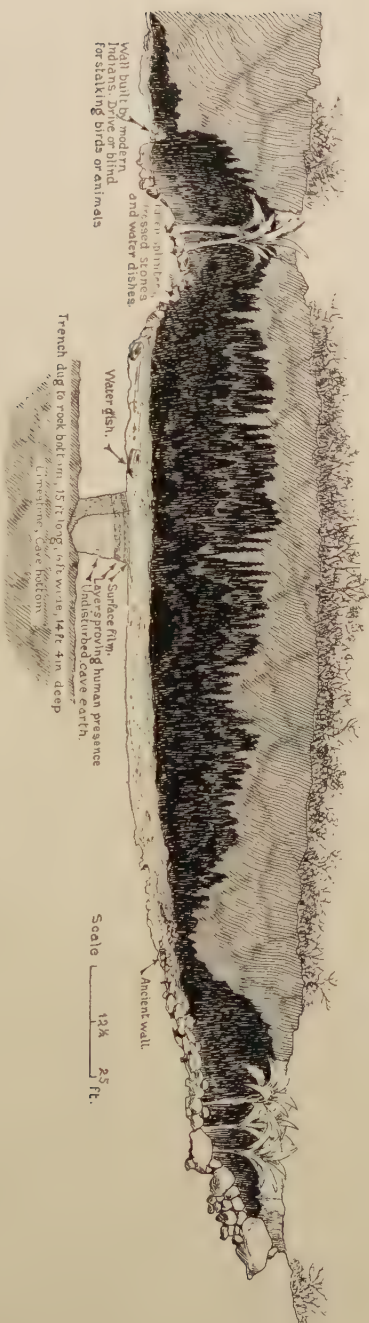
¹ There are two large ponds near Suschen, north of Valladolid, and, besides the lake Chichankanab, several pools on Berendt's map, north and south of Peto. Stephens saw water-fowl on one of a group of these near Uxmal, and visited others at Rancho Schawill, at Macoba, and near Mayapan. Excavation in the mud showed that one at Noyaxche, near Iturbide, had been paved with stones and contained below its floor-level four wells twenty-four feet deep and five feet in diameter, with small pits around its margin. In these holes the water had held out in the dry seasons for the ancient inhabitants when the pool had dried up. That the old Mayas had made careful use of these rain-holes was again shown at Rancho Jalal, where ancient filter-holes and cisterns were found concealed by mud at the aguada.

² The two deep rock pools at Chichenitza are about three hundred feet in diameter, and surrounded by precipices from sixty to seventy feet high.

³ Stephens, visiting Bechanen in the rainy season, described a small stream gushing from a rock crevice near an underground reservoir and losing itself in a neighboring *aguada*.

matter how difficult of access, they were natural and original sources of water-supply at certain times. The first-comer must have visited them or perished, and, if there was any value in the test of cave layers anywhere, these layers should have proved the presence not of one race only, but of all the races that ever visited the Peninsula. As we could see no reason to contradict this important proposition, we continued our search, digging down into the cave floors with an interest that grew more intense the more certain we were that the solution of the problem was within our reach.

Fig. 16.



Water-cave at the ruins of Oxkintok, ten miles east of Maxcanu.

CHAPTER V.

THE FIRST IMPORTANT EVIDENCE.

AT last, having thus relieved our minds of anxiety for the success of the work, we found a cave which fulfilled every desired condition. It had been first visited by Mr. Corwith on February 2, and lay in the midst of a group of mounds and ruins near the farm of Oxkintok,¹ a league and a half northward from Calcehtok, and one of its dependencies. A road turning towards it led upward into the hills, and brought us at last to a higher level, surrounded by the upper summits of the ridge. There the earth had grown less stony, maize grew in the red loam, and across the clearings we saw signs of ancient habitations. Mounds rose over the thicket, and knolls, littered with blocks of stone that crossed the road, had been walls of buildings or artificial enclosures. Several half-fallen vaults were the remains of stone rooms, and the entrances to other chambers, protected by wasps' nests, entered the sides of heaps of loose rocks overgrown with briars. Where the road crossed a series of dressed blocks set on edge, a high mound called Xemtzil stood on the right, and we stopped to look at its rough sides, down which stairways, platforms, and walls had crumbled into rubbish. Beyond, the road led by a row of Indian huts to a cattle-yard, and there a polite Indian, the overseer of the farm, greeted us at his cabin-door, and led us to the cave, a few steps away.

No ladder was used at the entrance, but we walked easily down the sloping *débris* of a sunken area, where a path leading into the darkness under overhanging crusts passed one of the rude walls resembling those noticed in Spukil. In spite of the light which glimmered ahead, we needed a candle to get over the loose rocks and down to the lower level of a large chamber, seventy-five feet wide and two hundred feet long, lit at the farther

¹ The Bishop of Yucatan gives me the Maya etymology: *ok*, three; *kin*, days; *tok*, flint.

end by a skylight. On the left, as we entered, lay heavy masses of fallen rock, but beyond these the smooth floor was almost entirely covered with a soft cave mould. Groups of very beautiful undisturbed stalactites hung from the roof, and these, together with the smoother portions of the dome, were tinted with orange, white, blue, green, purple, pink, and yellow, blending in intermediate shades. At the inner south-southeastern end of the room the light came in from a round roof-opening, about twenty feet in diameter, directly under which lay a heap of stones on which two banana-trees grew, reaching the outer air with their tops. What was once a wet cave, judging from the stalactites, was now generally dry in the dry season, though water still dropped at several points, filling two stone dishes, one of which stood nearly in the middle of the floor, fifty feet from the window. Here, then, was a cave, easy of access, close to a group of ruins, and seven hundred and eighty-five paces west of the mound Xemtzil, furnishing the precious water even in the dry season, dry enough and light enough for temporary habitation, easy of excavation, and with a floor unobstructed by downfallen rocks.

The charcoal and ashes scattered underfoot in all directions promised the solution of the problem we had come to solve, and, hardly able to restrain our excitement, we began a trench, fifteen feet long by six feet wide, in the middle of the floor, running at right angles to the long diameter of the cave, and fifty feet north-northwest of the skylight. If only no heavy fallen masses lay buried in the loose earth to obstruct us, our success was certain.

The Indians, throwing down their shovels and pickaxes, had lifted off the heavy baskets strapped to their heads, and one by one the objects contained in them were placed upon the floor,—a coil of rope, a tape-measure, several small pointing-trowels, a bottle of India ink and a pen, muslin bags of two sizes rolled in a bundle, tin plates, knives and forks, and kettles containing our luncheon of boiled black beans, rice, and chips of fried bacon. A bag of oranges comprised our dessert, and these, when rolled out in a heap, catching the rays of light from above, seemed to radiate a golden flame that lit up the whole cave.

Opening the India ink, we labelled a white muslin bag Ox. 1-1, to mean Oxkintok Cave, first trench, first foot, and, as the In-

dians cut into the earth with pickaxes and shovels, we lit the candles and, leaning down, looked closely at the loosened lumps, from whose sides projected the sharp angles of potsherds.

The first foot revealed a soft red cave mould, with charcoal and ashes. In it some of the fragments of pottery were polished and finely made. There were small bones, as identified by Professor Cope, of two species of bats, of birds, of a very small rabbit, a jaw of a mouse (*Peromyscus*), and shells (kindly named, with all others referred to in this volume, by Mr. H. A. Pilsbry, of the Academy of Natural Sciences of Philadelphia) of *Planorbis liebmanni* and *Cyclotus dysoni*.

The second foot, first six inches, showed less frequent potsherds and more small bones of bats and mice. There was a round stone, possibly a hammer. As in the other caves, we were cutting through a deposit of rubbish left by men who had built fires and cooked with earthen vessels at the spot.

In the second foot, second six inches, the potsherds had become quite rare. The small bones still continued, with now and then a larger splinter.

The shells, *Chondropoma largillierti*, *Cyclotus dysoni*, *Macroceramus concisus*, *Streptostyla biconica*, and *Glandina cylindracea*, were found indiscriminately in the upper and lower six inches of the second foot.

In the third foot potsherds had become very rare. Only one or two were found, and with them the left humerus of a medium-sized deer and a large Fulgur-shell (*Fulgur perversum*). The bat bones continued. We seemed to have come to the end of the soft cave loam, and had reached a harder red soil, like clay.

The fourth foot revealed no pottery at first. We found many small snail-shells (*Helecina fragilis*, *Cyclotus dysoni*, *Chondropoma largillierti*, *Orthalicus princeps*, *Bulimulus superastrus*, *Glandina cylindracea*), several bones of birds, the wing and limb of a bat, and two small potsherds, which may have fallen down from above. The small bones continued. The clayey soil contained a few bits of charcoal, and, though the digging was still easy, the work went on slowly. When the broad blade of the pickaxe was wanted the Maya Indians used the sharp point, lifting the long-handled shovels from the arm's end to pour off the earth, as they would have emptied a ladle of soup, or stopping to

pile the blades full with their hands ; but a word of explanation or correction was always answered with an obliging smile. It was impossible to be seriously provoked with them.

The fifth foot, first six inches, revealed no pottery, but many small bones, among which Professor Cope and Mr. Pilsbry afterwards identified those of large mice, a rabbit, a bird, and snail-shells (*Glandina cylindracea*). The digging was still easy. We found a piece of egg-shell, but it was doubtful whether the mellow earth contained any more charcoal.

In the fifth foot, second six inches, the observed conditions were the same. We found the bones of birds, mice (*Peromyscus*, large and small), and the jaws and other parts of rabbits.

The sixth foot, first six inches, showed numerous humeri of mice (*Peromyscus*, two species), the bones of deer (two kinds, small and medium-sized), the scapula of an iguana, the pelvis and humerus of a rabbit, a fragment of the hypo-plastral bone of a tortoise, and, along with the jaw of a small mammal and the bones of an opossum, several small snail-shells (*Bulimulus superastrus*, *Chondropoma largillierti*).

The second six inches of the sixth foot showed the humerus and ulna of an ungulate mammal, the jaw of a weasel, various bones of several species of bird, the remains of a rabbit, and abundant bones of mice, along with *Bulimulus* and *Chondropoma* shells, as before. The remains of these animals and shells, though broken and scattered, showed no trace of fire or sign of cookery. We seemed to have got below the limit of human interference with animal life.

By this time the Indians were unable to throw the shovelfuls out of the pit, and we made use of their back-baskets, tied to lengths of rope, as buckets. When these were hauled up the sides, full of earth, portions of the upper wall of the trench were scratched away and fell backward.

In the seventh foot I could find no regular hearth, and indeed no positive sign of charcoal and ashes. No pottery had been seen since the fourth foot. The small bones continued, and there were a very few larger fragments, some of which appeared to have been split. Again we found remains of a small deer, and with several lower jaws of two species of mice (*Peromyscus*) there were the jaw of a rabbit, the femur of a medium-sized bird,

the lower jaw and upper canine of a mink, the lower jaw of a lizard (Iguanidae), and a vertebral fragment of a colubrine snake.

In the eighth foot the minute bones were much scarcer. I found a small potsherd, but on careful examination concluded that in all probability it had slipped down from the layers above while the men were clambering the sides of the trench or hauling up baskets. The soil was still red and comparatively soft, containing very few pieces of limestone. The only possible signs of man found were minute black particles resembling charcoal, and small and rare fragments of bone that seemed to have been split for marrow.

The ninth foot, first six inches, revealed very few bones in the red earth. There was the shell of *Macroceramus concisus*, but no trace of man.

In the ninth foot, second six inches, we found a potsherd, but as it had black earth sticking upon it, and as all the earth around and under it when found was red, it had certainly fallen from above. We scraped off the bottom of the trench here and found red clay, apparently undisturbed, all over the floor. In it there were traces of a whitish powdery substance, which was probably decomposed limestone, and we found one delicate snail-shell and some fragments of small bones. No sign of man was discovered, and by this time it was perfectly clear that we had got beyond all sign of humanity from above. If we were to encounter man below this depth, we would find him under new conditions. If palaeolithic peoples had existed in Yucatan we were within a few feet, possibly a few inches, of their traces. Prepared for a surprise at any moment, we went on slowly into

The tenth foot. In it bones were so scarce that those found we feared might have slid from above, until, on scraping the floor clean at nine and a half feet, we unquestionably found several small fragments of bat or mouse bones and the shell of *Bulimulus* (species undetermined) bedded in the undisturbed earth. There was not the slightest sign of humanity.

In the eleventh foot the little bones were very scarce, but several, among them a bone of a rabbit, were positively found, on again scraping the floor and scratching into it. There were one or two small shells. The whole floor deposit in the cave, covering an area of at least one hundred feet square, was probably as free from stones and as soft as the part we were now considering, and

the discovery of a human trace undisturbed at this depth would have been so important that we began to take precautions to eliminate the chances of mistake through objects falling from above when the trench was widened, or from other causes. After carefully removing all the loose earth at the bottom of the pit and paring off an inch or two of the hard undisturbed soil below it, we went over the whole floor surface for three or four inches with the trowel, and then, kneeling down, candles in hand, scrutinized the ground upturned.

When in the *twelfth foot*, at a depth of eleven feet six inches, we had scratched into the undisturbed bottom in this way, we found some bones of animals, apparently larger than bats, a fragment of stalactite about five-eighths of an inch in diameter, and small fragments of limestone; then the bone of a bat or bird, some small lumps of a dark substance, or black oxide resembling charcoal, a small snail-shell, and a lump of limestone two inches in diameter. At the inner end of the trench the soil became hard and gritty and contained pieces of limestone. I found there a small bone, and a little scratching discovered thick masses of limestone splinters, some of them discolored almost black, as if by the action of oxide.

As we toiled on, in the light of waning candles, smeared from head to foot with clay, with the chief secret of Yucatan almost in our possession, the thrilling interest of the moment got the better of weariness. Not knowing what important revelation to expect, we went downward into the *thirteenth foot*. When the floor was cleaned off and examined at twelve feet two inches the mass of limestone splinters had grown thicker at the inner end of the trench, and contained a number of well-preserved little bones. By this time we had made up our minds, from the depth of the undisturbed deposit passed through, that if any trace of earlier humanity existed below us, the next few feet would disclose it. But all hope of any such discovery had to be given up when we reached rock bottom on the inside of the trench, at twelve feet nine inches. As the ledge was not level but sloped downward gently toward the middle of the cave, more work was required to lay it bare along the full length of the trench.

The *fourteenth foot* reached the rock in the middle of the trench at thirteen feet two inches, and at the outside of the trench at

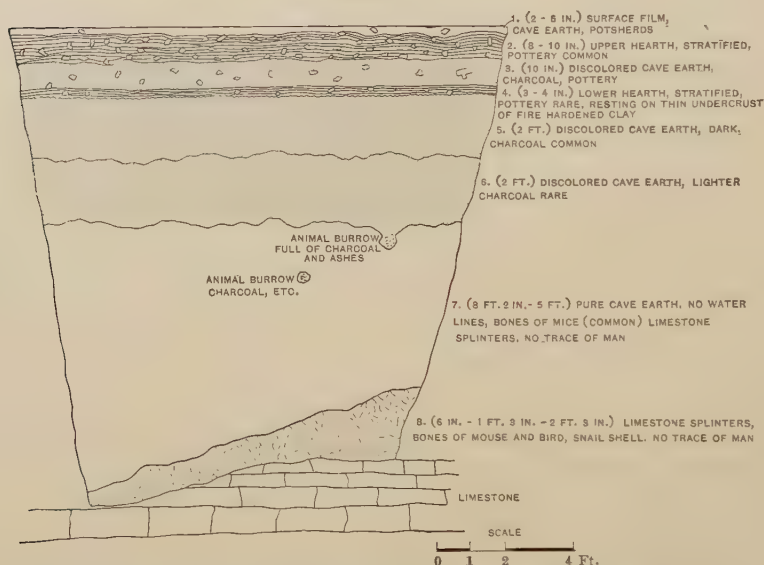
fourteen feet four inches. There were bones of the rabbit, the mouse, and a small bird close to the rock bottom, at about thirteen feet three inches, and a snail-shell (*Cyclotus dysoni*) at thirteen feet. A piece of stalactite and the tooth of a small rodent lay on the rock, and in earth loosened by digging I found the knuckle-bone of a small animal, but was not certain that it had not fallen from above. The small bones found were better preserved than the larger ones, which were generally broken or had lost their characteristic shape. On the bottom the loose pieces of limestone were decomposed in some places, and formed a layer by themselves on the outside of the trench six inches thick, in the middle fifteen inches, and on the inside twenty-seven inches thick. Next above the splinters the mealy red earth was comparatively pure, but on close examination, inside the trench, neither it nor the layer of splinters showed the slightest sign of human life.

The trench now finished had settled one important point: that no human trace, no blackened film, showing the comings and goings of men on an earlier cave floor, existed below the limit of the hearth deposit encountered near the surface. Yet one question remained before we were done with downward excavation. Had we reached the bottom of the cave? The trench, tapering down gradually from the top, had decreased at the bottom to a length of seven feet three inches and a width of two feet three inches. But the rock laid bare echoed as solidly to the blows of the pick-axe as did the outer walls of the cave. Had the ledge been a dislocated mass large enough to give so solid an echo, the ceiling would probably have shown signs of its downfall, while if one such mass had fallen from above, others equally large must have gone with it, to account for the absence of breaks and hollows in the vaults overhead. Though not certain, it was probable that we had reached the true bottom of the cavern.

The main question of the excavation was answered. No fossil man, antedating the maker of the superficial rubbish by a geological epoch, had been found in the cave. But other inquiries hardly less important remained. Now that the whole arrangement of earth bands was clearly exposed, it was necessary, if we were to grasp the meaning of the discovered human rubbish and fix its association, to subdivide and classify the layers one from

another, studying their contents as we advanced into them inch by inch with the trowel. To do this footholds were made in the sides of the trench by wooden props set in notches; and after many hours' careful work by the light of candles socketed in the clay, the following series of subdivisions (see Fig. 17) was positively

FIG. 17.



Old refuse layers, proving the visits of man to the water-cave at the ruins of Oxkintok, Yucatan (seven hundred and eighty-five paces west of the mound of Xemtzil). Face of Trench 1, looking north, cut through the cave floor to apparent bed-rock (at fourteen feet four inches), February 9, 1895.

The traces left by the first visitors to the cave are believed to be shown in Layers 6, 5, and 4.

The time when the Mayas were building the present ruins in eastern Yucatan is believed to be indicated by Layer 2.

The period since the abandonment of the ruins near by and after the Spanish conquest is probably shown by Layer 1 (with part of Layer 2).

ANIMAL REMAINS AND SHELLS, with human refuse (by depth, first to bottom of fifth foot): bird (several species), mouse, rabbit, bat, deer (two species), *Glandina cylindracea*, *Streptostyla biconica*, *Bulimulus superastrus*, *Macroceramus concisus*, *Planorbis liebmanni*, *Cyclotus dysoni*, *Chondropoma largillierti*, *Helecinia fragilis*, *Fulgur perversum*.

*Close below human refuse, allowance for down-faulting (by depth; from bottom of fifth to bottom of seventh foot): iguana, colubrine snake, tortoise, bird (several species), opossum, mouse (two species), rabbit, weasel, deer (two species), *Bulimulus superastrus*, *Chondropoma largillierti*.*

*In undisturbed cave earth (by depth; from bottom of seventh foot to rock bottom in fourteenth foot): bird, mouse, rabbit (on bottom), *Bulimulus superastrus*, *Bulimulus* (undetermined), *Macroceramus concisus*, *Cyclotus dysoni* (on bottom).*

made out. Nothing was trusted to memory in the description which followed. I studied the layers with the trowel, and while

doing so dictated the details to Mr. Darlington, who held pencil and note-book above.

Layer 1 was a surface film of black cave mould, from two to five inches thick. In it I found a piece of fine polished pottery with grooved decorations, the shell of *Bulimulus superastrus*, and again another polished potsherd of very superior make. Some coarse, heavy fragments lay near it, and about two inches above the line of

Layer 2, a very distinct band of charcoal and ashes eight to ten inches thick. In it I found large, smooth potsherds of thick, heavy manufacture, with thin and finely polished red and brown fragments, and coarse pieces decorated with scratchings. Taken out one by one with the trowel, these sherds (see Fig. 18) were found distinctly bedded in the ash-bands. But in the area thus examined with the trowel, three feet wide by fifteen feet long, we found no sign of white man's contact. A snail-shell (*Glandina cylindracea*) and the bone of one animal, about the size of a deer, cracked as if for marrow, were found with the sherds, but the comparative absence of split bones in the layer was as noticeable as was that of pieces of chipped flint, or implements of wood, stone, or metal. The chief token that man had left was the token of pottery, and that was very abundant.

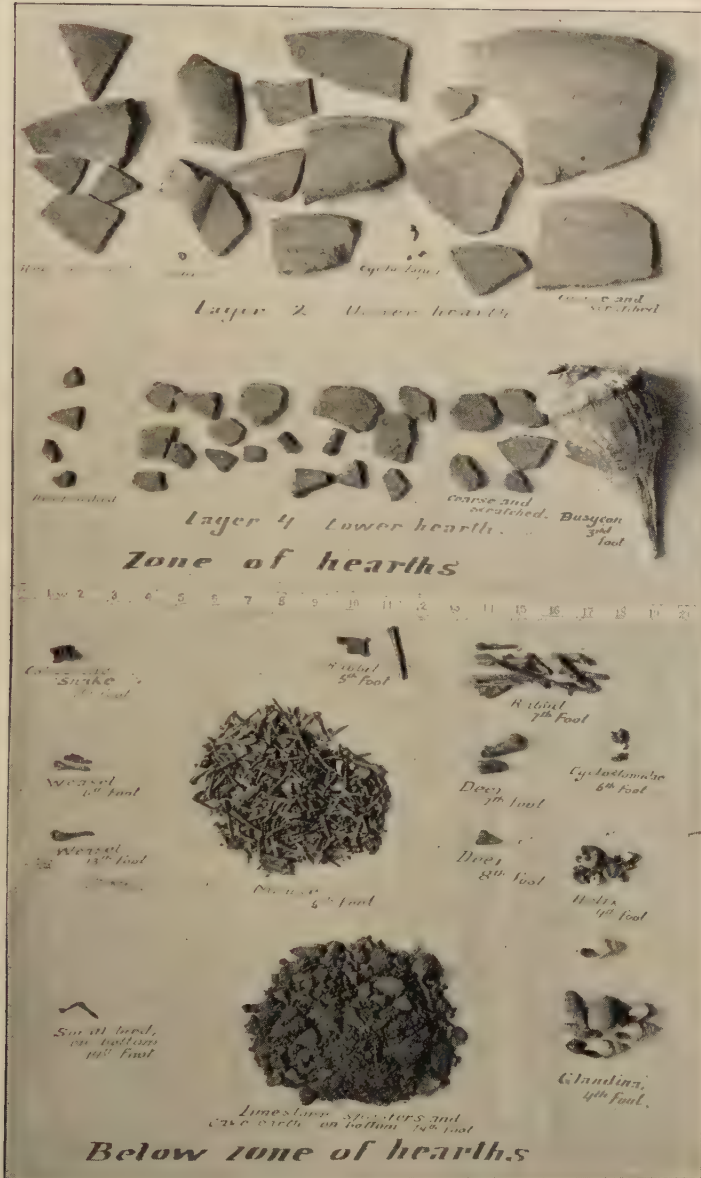
Layer 3 (ten inches thick) was one of those partitions between clearly-marked rubbish layers referred to in the introduction. Unlike the artificially-formed accretions of ashes and charcoal (Layers 2 and 4) above and below it, it consisted of cave earth, and if it had been produced and laid down by nature should have represented a considerable interval of time between the comings of the cave visitors. But from top to bottom it was discolored with charcoal, and in it I found, besides bat bones and small pulverized bone fragments, three potsherds (two of which were red and polished) half-way down in it, and at the bottom, and resting on the hearth below (*Layer 4*), other fragments, one large and thick, and very strong.

Judging by these facts and the disturbed appearance of the whole mass, the probability was that the layer had not been laid in its position by the earth-forming agencies of the cave, and did not stand for a reckonable time interval, after all, but had been scraped, swept, or spread in its place by the builders of some of the fires.

Layer 4 (three to four inches thick), next below, demanded our most careful attention. It was a distinct hearth-band of charcoal and ashes, which, on paring away the bank, was seen to continue all the way round the trench. At the outer end and inner side of the trench it appeared to blend with the stratum above it (*Layer 3*), and even run into the upper hearth (*Layer 2*, see Fig. 17). At other places, much more compact than the loose earth above, it marked a sharp, clear line on the bank, while the clay just under it, apparently hardened by the action of fire, bordered it with a contrasting stripe of light red. As seen at once on completing the trench, this hearth was the chief point of interest in the excavation. Whatever its antiquity, it represented the time of man's first coming to the cave, for, save for the zones of stained earth described as *Layers 5* and *6*, there was no human layer below it. Who and what the first comer was would depend on its contents. As explained before, it was clearly separated from the upper hearth (*Layer 2*), through which we had passed, by ten inches of cave earth, and the question was one of discrimination between the two layers. Judged by its contents, did *Layer 4* refer to an earlier stage of human culture or a different race of cave inhabitants from that denoted by *Layer 2*? We had not worked far before we found that this lower hearth, less clearly marked by gray ash lines than *Layer 2*, seemed to taper out into an undistinguishable film towards the outer end of the trench. We noticed a very few fragments of bone in it. But as in the upper layer (*Layer 2*), so in the lower (*Layer 4*), the striking fact, besides the extreme rarity of larger animal remains, was the absence—no less marked—of all other traces of primitive life except pottery. The arrow-head, the chipped blade, the hammer-stone, the polished amulet, the bone needle, so characteristic of the midden-heaps of savage races in the north, were wanting.

After long intervals of scratching with the trowel, which revealed nothing but charcoal and ashes, I found eleven fragments of pottery, coarse and fine, red and black, polished and unpolished, in *Layer 4*. Small as they were, their make was not inferior to that of specimens from the upper hearth (*Layer 2*, see Fig. 18), and there was no question that they were embedded between the lines of charcoal and ashes, as nearly every specimen found was dug out with my own hands after having cleared away with the trowel

FIG. 18.



From the cave at Oxkintok. Pottery, etc., and bones, from the human refuse deposit on the cave floor and the undisturbed earth below.

Specimens studied in comparing the upper and lower hearths. The ware of the latter, though rare, generally equivalent to that of the former. Below are the remains of birds and animals present in the cave before man came.

all superincumbent earth of Layer 3. Thus, an area twelve and a half feet long and five feet wide, running along the outside of the trench, was examined, layer by layer, with the utmost care possible, specimens being placed in labelled bags immediately on discovery, while the above descriptive notes were dictated by me to Mr. Darlington as the work went on. Towards the outer end of the trench the distinct bedding of the lower hearth (Layer 4) grew faint as we advanced into the bank, and at a distance of about three feet inward from the face of the trench it seemed to disappear altogether. Resting immediately on Layer 4, if not directly in it, I found a large potsherd of the unpolished red type; also a polished black fragment, and then a polished black piece directly in the bed of the hearth. At last I found the femur of a mouse, a shell of *Cyclotus dysoni*, and the leg-bone of a large fowl, split, as if for the marrow. But the absence of any other such specimens left us to infer either that the fires had been built by peoples who lived on grain and cereals, or that they were made for some other purpose than cookery.

By this time radical differences between the two hearths should have been disclosed had the lower fires (Layer 4) been made by a people inferior in the scale of culture to the builders of the upper hearth (Layer 2). But no such differences appeared. The only culture test was pottery, and that was as well made below as above. The fauna of the cave, most thickly represented in the sixth and seventh foot of the trench, comprised a list of genera and species, some of which, like the rabbit and mouse, might have reached back into Pleistocene time, but all of which probably still existed. The bones, therefore, could nowhere be held to denote geological antiquity, and without such evidence there was nothing in the band of separation between the hearths (only ten inches thick) or in the depth of the lower layer (only two feet below the surface) to presuppose great age. The inference was that the lower hearth-band (Layer 4) was the result of fires built by the first wave of Maya immigration, and that the cave had been visited by one race of people, and one only, in pre-Columbian times.

Our study of the interval of earth, continuing downward to the rock below, gave no reason to doubt this conclusion. After the most minute examination of the bank we learned that zones

of disturbance and discoloration (Layers 5 and 6) stained the cave earth for four feet beneath the limit of Layer 4 (see Fig. 17), and that below this (Layers 7 and 8) a deposit of undisturbed red earth, sprinkled with the bones of rabbits, mice, birds, and bats, and limestone splinters, into which animals had burrowed, extended without human trace to the rock.¹

We subdivided the lower earth into layers for the purpose of clearness, but, taken as a whole, the mass seemed to show no geological breaks. A deposit of limestone splinters and red clay, about eleven feet thick, and underlying the human rubbish, had formed on the cave floor. How it came there we failed to explain. When examined it seemed too coarse to have filtered through the roof, like some exquisitely fine clay, composed of disintegrated shale, that fills one of the underground chambers at Port Kennedy. Neither did it show the filmy bandings that indicate deposition by water. However it reached its position, a good many lime-

¹ Proceeding downward from Layer 4, we worked against the side of the trench without advancing into it. The first thing we learned was that disturbance and discoloration had penetrated the ground for four feet below the lowest hearth examined. This zone of faint disturbance was unmarked by any distinct ash-band. Its only characteristics were its artificially darkened color and the small particles of charcoal that lay scattered through it. I subdivided it into two layers (see Fig. 17).

Layer 5 (two feet thick), darkened cave earth, with particles of charcoal frequent; and below the waved border-line marking its bottom,

Layer 6, two feet thick, lighter discolored cave earth, with particles of charcoal rare. Just at the bottom of this latter layer I found the burrow of an animal penetrating inward and upward into the bank, full of downslidden charcoal and ashes. Immediately above the hole a considerable portion of the bank showed disturbance, and the lower sides of the burrow were covered with a light film of ashes about an eighth of an inch thick. The bottom of Layer 6 was marked by a faint belt, distinguishable by candle-light at a depth of about six feet, that extended entirely around the trench. It marked the lowermost line of disturbance from the hearths above.

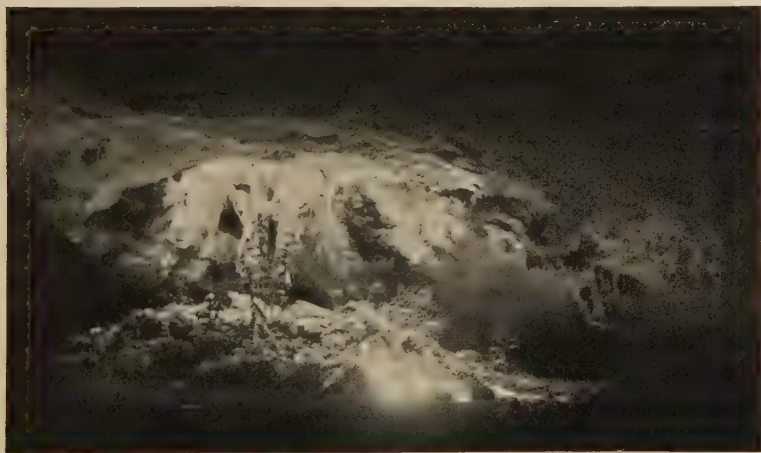
Layer 7 (five feet to eight feet two inches in depth) consisted of a belt of pure, dark-red cave earth, containing several small bones (unidentified) and a few limestone splinters, but no trace of man. I could find no lines of stratification in it, or indications of its deposition by water. At a depth of seven feet nine inches, and near the middle of the trench, I found a small animal burrow, running horizontally inward, full of charcoal and ashes.

Layer 8 (six inches, one foot three inches, and two feet three inches in depth) was a belt of limestone splinters mixed with cave earth, resting upon the rock floor. In it I found mice, rabbit, and bird bones, with a snail-shell (*Cyclotus dysoni*), but no trace of man.

stone splinters had fallen from the roof before it began to form, and the cave was open to rabbits, mice, and birds when the ledge at the bottom of our trench, fourteen feet below the present surface, and sprinkled with their bones, was bare floor. The remains of still familiar smaller animals, dying in the earth as time went on, seemed to have been scattered through it by birds, insects, and other animals before the coming of man. But the process of soil formation once begun had continued uninterruptedly, and not until it was almost finished had man disturbed the top of the deposit with his fires in geologically recent times.

Our work in the cave, which had lasted seven days, was now finished, and our thoughts wandered away from its inferences, hardly realizing the results of what we had discovered. The

FIG. 19.



Skylight in the water-cave at Oxkintok. The banana-trees are growing on a heap of fallen limestone fragments, many of which have been hollowed for water-dishes or mortars, or dressed square for wall building by the makers of the neighboring ruins. No trace of the tools used was discovered.

light was fading at the window, and the candles glowed brighter in the gloom, as we gathered up our clay-smeared tools, and filled the Indians' baskets with specimen bags stuffed with earth samples and grimed potsherds that few museums would care to exhibit. Then, ascending into the fading day, we turned homeward with light steps, while the wind came fresh out of the west, and ruins, hills, and forest glowed in the prismatic hues of sunset.

CHAPTER VI.

A FIRST GLANCE AT THE RUINS.

WALKING to Opichen one night, we found the whole town in a state of excitement at the occasion of a public ball. The crowd thronged around a thatched shed fenced with wicker, from which came the sound of music. Flickering torches lit rows of booths set along the road and under trees, at one of which an old woman, cooking over an open fire, sold us chocolate, stirring the beverage in the usual way with a stick twirled between the hands and sprinkling it with cinnamon in the cups. For a while we turned away from the dancers, and, entering a hut near by, sat down at a table to eat a kind of fine vermicelli, a soup of strange flavor, and a dish of cold shreds of meat stewed out of all taste in a watery sauce. These we seasoned with *Chile* (native pepper) set about in little plates, varying our mouthfuls with tastes of grassy salad. After our hospitable friends had filled our glasses with lukewarm Monterey beer at half a dozen of the stalls, we made attempts to return their kindness, but in vain. "A glass with me, gentlemen," was always accepted, but there was no use trying to pay. A nod or wink to the salesman from some one in the crowd had settled the matter. Bystanders till then unknown compelled us to accept their hospitality. Cigars were continually passed around, and twice the Indian blacksmith of the hacienda begged us to choose from a box of expensive luxuries done up in lead foil. That we had smoked enough was no answer to this poor man, whose daily wages were seventy-five cents, and whom we should never see again. We must fill our pockets.

The old overseer at Calcehtok was master of the revels, and led us to our seats under the shed to see the dance, which, in spite of the gay music of fiddles and flageolets, was solemn and monotonous. Instead of claspings, kickings, voluptuous twirls, and expressive looks, we saw dancers stiff as lay-figures, out of mutual reach, and moving about the floor slowly in circles. Their arms

hung by their sides, and their faces had the look that the photographer recognizes when expressive features are focussed by the camera. In the *toros* and other dances the girls spoiled their pretty looks by wearing men's hats, yet we were expected to admire them rather than their poorer cousins and sisters who, dressed in the beautiful costumes of every day, leaned over the wattles from the outside.

FIG. 20.



Meztiza of Opichen.

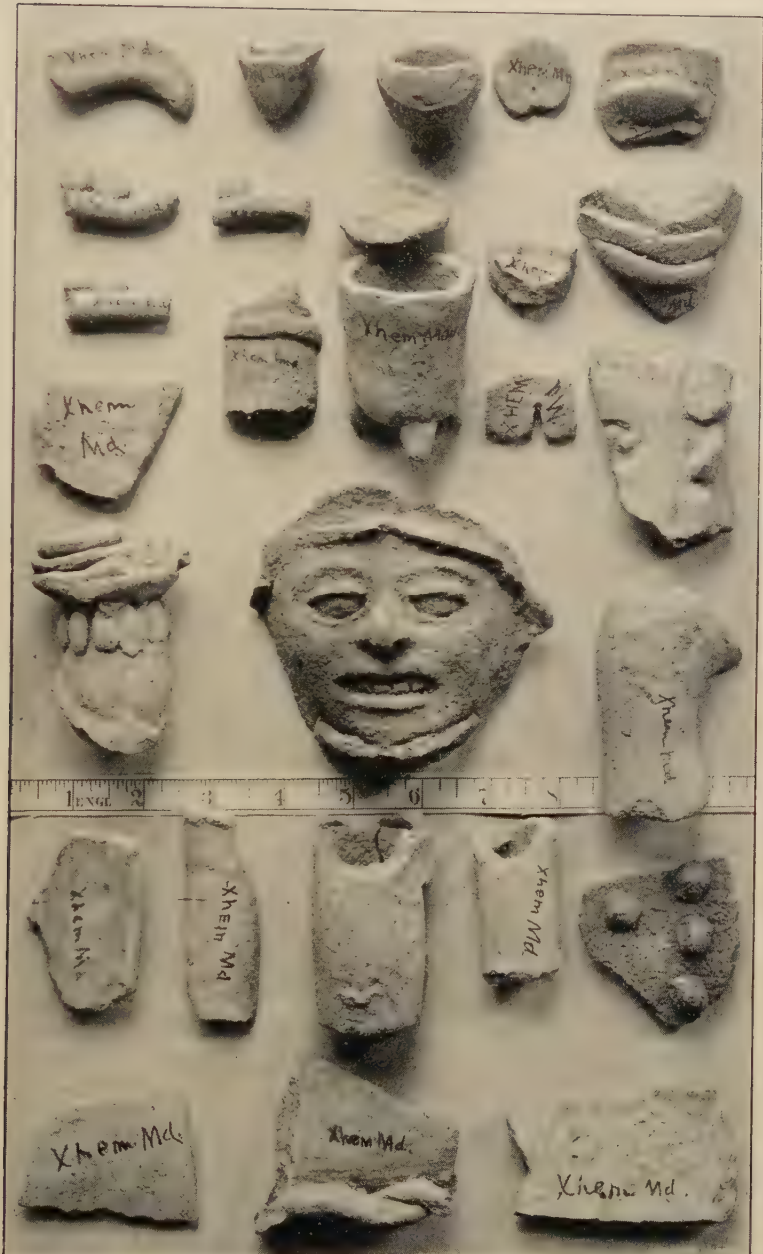
Next morning at the bull-fight it was these charming figures in blue and white that often diverted our attention from the funny and harmless performance in the ring. Nearly twice as

numerous as the men, they crowded the whole circular balcony set on poles and floored with leaves and twigs. No bulls were killed, and no horses blindfolded or hurt in public. One after another the animals were brought in to be teased by gayly-dressed men on foot and horseback, and after a few charges, tumbles, leapings of men over the walls, and curvetings of steeds, the gates opened and *el toro* trotted out, followed by the horsemen hurling lassos. Then after we had photographed the ring, riders, and bull, by particular request, our turn came, and we explained that one of our objects was to take photographs of some of the pretty girls in the village. Our friends smiled obligingly, and several of them disappeared, to return presently with two dusky beauties dressed in their best. It took us some time to find a neighboring garden where the background seemed appropriate, then to choose the proper shade, and, last, to get the focus. As the girls only spoke Maya, means of communication by language were denied us, and the many changes necessary had to be explained by gesture. But there was no hurry in the process, which occupied at least an hour, and resulted in two wretched negatives.

Busy with the excavation at Oxxintok, we had not taken time to examine the neighboring ruins until the work was over. Mr. Corwith, digging a few feet on the top of the high mound called Xemtzil, besides finding the specimens of earthenware shown in Fig. 21,¹ laid bare foundations of walls and one of the level areas of plaster which I afterwards learned capped the summits of many of these structures, where the buildings, as Señor Maler, of Ticul, informed me, often rose in three plaster-roofed tiers against one side of the mound. These layers of plaster, serving as the floors of terraces, are now exposed on the sides of the mounds after the crumbling of the buildings. Xemtzil and many other tumuli examined seemed to contain no chamber in the interior of the stone pile which was their central structure, but near Oxxutzcab we saw a heap of stones which had a vaulted

¹ These fragments (see Fig. 21) seem generally to have formed parts of human figures made of a light-gray, unpolished, and imperfectly-baked ware, not matched, with a few possible exceptions, by the harder painted or polished sherds from the neighboring cavern. Later, however, we found pottery at the ruins (*i.e.*, in cisterns) that fairly showed its similarity with the ware from the caves.

FIG. 21.

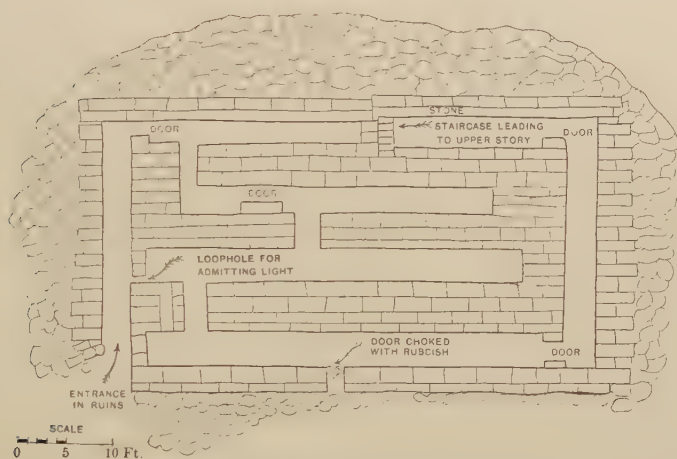


Unpolished potsherds, cups, and fragments of earthen statues, rough, imperfectly baked, and light gray, found by Mr. Corwith, in digging on top of the mound known as Xemtzil, close to remains of a platform of stucco, one to two feet below the surface. See foot-note to page 60.

room in the middle of and underneath it, and one of the stone mounds, overgrown with brambles, near Xemtzil was honey-combed with artificial passages. These formed the labyrinth visited by Stephens, and called by the Indians "Tzat un Tzat" (Lost and Lost). As Stephens did not make a careful measurement of the place, we spent some hours in examining it and drawing the following plan. (Figs. 22 and 23.)

The construction of the passages, like that of all the rooms in the temples where projecting tiers of stone meet each other from the opposing walls, showed ignorance of the principle of the arch. The faced stones in the passages were rudely chipped square, but

FIG. 22.



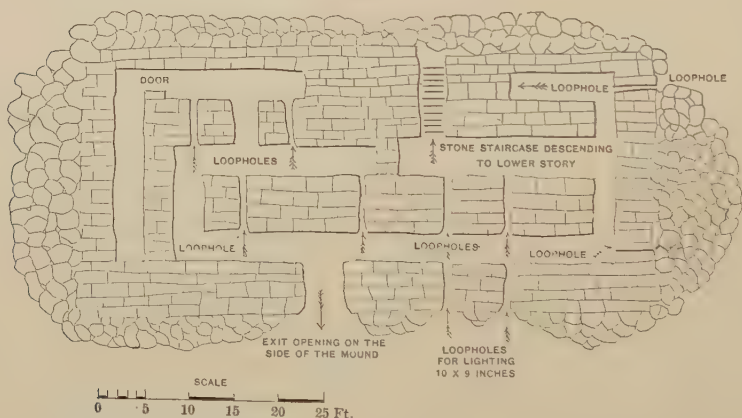
Tzat un Tzat (Lost and Lost). Plan of the lower story of the supposed labyrinth called Tzat un Tzat, at the ruins of Oxkintok, Yucatan. The walls are built of roughly-squared limestone blocks and mortar. The passages, six to seven feet high, are roofed by letting three tiers of flat stones project towards each other from the opposing walls, and setting capstones above them. Thus a rude effect of vaulting is produced. A staircase leads from the innermost passage of the lower story to the upper story, directly above. The whole is covered by a ruined artificial mound of stones. This is oblong in shape, three hundred and sixty feet in circumference and thirty-one feet three inches high.

Plan drawn and measured February, 1895, with the assistance of a chart made by Felix Martin Espinoza. The loop-holes are not all given. The thickness of some of the inner walls may be inexact.

not dressed, and not laid up systematically, so as to bind the joints, as masons say. When one stone rested over a joint below it, it seemed to have come so by chance, and places could easily be found where for two or three feet the crevices lay in line, one above another. Inside the exposed wall of faced blocks there

was a rubble of stones and white mortar that looked as if it had been dumped in like concrete. The entrance, at the left corner of the tumulus, seemed about on a level with the ground; and about seven feet above it, in the middle of the slope, opened a door or window about two feet in diameter. The whole mound, one hundred and twenty paces in circumference and thirty-one feet three inches high, measured with the monocular level, was covered with loose stones and overgrown with a repulsive tangle of thorny bushes. On the top two or three larger trees shaded the walls of a room whose ceiling of dressed blocks had fallen in. As we entered and followed the passages, which grew narrower at places and were sometimes half blocked by abutments at the turnings, several bats flew by our faces, to return again and flit along the vaults when the candles were lit. Here and there gleams of light came through small loop-holes, about six inches in

FIG. 23.



Tzat un Tzat (Lost and Lost). Plan of the upper story of the supposed labyrinth called Tzat un Tzat, at the ruins of Oxkintok, Yucatan. This story lies directly above the lower, under an oblong stone mound thirty-one feet three inches high. Drawn and measured February, 1895, with the assistance of a chart made by Felix Martin Espinoza.

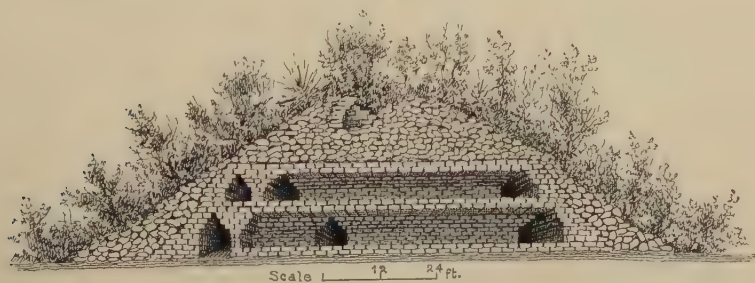
diameter, connecting the galleries with each other or the outer air, and several times we halted near them to wonder how obstructing heaps of *débris* had found their way into well-preserved parts of the passages. The mortar used between the face-stones, containing small powdered fragments of limestone, was very white, and crumbled rather easily under the point of a knife. As flat limestone splinters had been pushed into it at the larger interstices,

and as these pieces had evidently been chipped off the building-stone in roughly squaring the blocks, it seemed probable that much of the stone dressing had been done on the spot. There were two stories, forming rectangular tiers of galleries, one above another, about fifty-six feet long by twenty-six feet wide, in the mound, and these, as shown in the drawing, were connected by a staircase. A portion of the masonry rested on a bed of white, decomposed limestone, known as *saccam*, and where one of the passages ran directly through this the side wall had been omitted, leaving the *saccam* exposed almost to the ceiling, save at one point, where a narrow area of wall was built into the deposit from the floor up. This, our Indians told us, was the door of a passage blocked up to prevent wanderers becoming lost in unknown galleries that led beyond it. To test the truth of the story, Mr. Corwith removed several of the stones, only to find the *saccam* solid behind them. What looked like a door was a sort of pier built in a weak part of the *saccam* to keep the ceiling from falling down.

Other mounds like Xemtzil confronted us with the same profile of loose stones and brambles, as we made our way through the bushes. Again and again we paused before the vaults of stone rooms, all of the same narrow shape, all dimly lit with loop-holes, and all vaulted by the leaning in of their walls. None showed signs of painting, but one revealed in the shadow of its ceiling, exactly in the centre of the vault, a single stone, well carved in flat relief, with the conventionalized outlines of a human figure.

Profitable months might have been spent in mound-digging at Oxkintok, but our purpose left us little time to devote to ruins, however interesting, and this hasty inspection brought our visit at Calcehtok to an end.

FIG. 24.



Tzat un Tzat.

CHAPTER VII.

CAVES THAT WERE DOUBTFUL.

THE next centre of investigation, Señor Escalante's hacienda of Yokat, twelve leagues down the range, offered us again all the facilities we were leaving behind us, and, as if for our particular benefit, a road leading to it ran along the whole hill range in the direction of our work. There seemed no reason why this level highway should have been washed bare of earth, and we hoped that, except in the case of a few traversing ledges, it would offer the *volan* driver no chance to show us again what jolting means in Yucatan. But luck was not with us. Save for a few reaches of red earth, we found the road nearly as rough as any we had seen, and, as the mules did not seem to be any more capable of stumbling when running over the rocks than dogs, we bounced as we had rarely bounced before. The heavy-tired wheels could not or would not break, and there was no check to the dare-deviltry of the driver. When not rolling cigarettes or making shrill chirrupings, he would stand up on the shafts like a Roman charioteer, peep under the axles, or wind his whip around the yelping body of a dog at full gallop. Crouched upon a mattress stuffed with vegetable pollen, in the swinging car, twisting and untwisting our cramped position, with legs "asleep," backs jarred, and sides aching, we became ashamed of our own anxiety and resigned ourselves to the worst, with a forced smile. Luckily the day was cool and cloudy and the way was full of interest.

Leaving Opichen behind us, we kept close to the long ridge that led onward into the southern distance. Hardly a league was passed without a sight of the crumbling sides of a mound or ruin. Once or twice rough roads turned off to cross the mountains, and lanes led to haciendas, at whose corners stood *sicbo*-trees, sometimes shady, but often girdled and dead, or cut down and rotting on the ground. Once I saw a carved stone figure from the ruins built into a fence. It was late in the afternoon when palm-trees

in the distance announced our approach to Muna, and passing first the small wattle and clay huts of the Indians, thatched with palm, we came to walls of plaster, decorated in the fashion with trowel slits each about three inches long, in the middle of which was set a small fragment of stone. Leaving these, the way led through a large grassy common, bordered with colonnades and fronting an open reach of country. There dogs lay asleep in the dust, and donkeys browsed near an old church whose weather-stained pinnacles rose dark against the western sky. Circling about the green, we halted at the well, where spreading trees, growing on a platform of stone, shaded a large water-tank. Under the leaves

FIG. 25.



Maya girl.

a mule fastened to a squeaking turnstile lifted a string of buckets on a wheel, and the water fell into the tank with a soothing sound. We climbed out of the *volan* and sat upon the cool stones. All the while groups of village girls, carrying water-jars, came to the place, each throwing a handful of maize into an earthen dish, the mule-driver's toll, exchanging a few words, and turning away. They stepped gracefully, holding the water-jars under their arms,

as they leaned to keep their balance, while their white robes fell in graceful folds under their head-dresses of purple and dark blue. The sun was setting when we left Muna, and night soon compelled us to drive more slowly over the rocks, until at last a high chimney, with lights, and the black outlines of a grove showed the driver in the dark where to turn off the high-road and into a lane. We halted to open the wooden gate of a cattle-yard, and then, picking our way through the herd, drove over a stone pavement and drew up on the level by a veranda lit with flickering lanterns. This was Yokat. The choosing of rooms, the cooking of supper, and the swinging of hammocks occupied our thoughts after our baggage-carts came, but we caught glimpses of arches and columns, long reaches of white wall under a starry sky, and the dimly-lit trunks of palm-trees, that seemed to transport the scenery of the Arabian Nights into the wrong part of the world. The morning showed green leaves, glowing with oranges, over our windows, and we heard the singing of birds and the splash of water. The fertile oasis was more beautiful than Calcehtok, and we felt properly grateful to Señor Escalante, our host, for inviting us to halt there until our work was done.

As we had already ransacked the hills nearly as far as Muna, Yokat offered us the next chance of verifying, if possible, the significant results of Oxkintok. The caves reported one after the other by Indians, and described by the kind engineer, Mr. Gukey, were sometimes on the declivities of small valleys and oftener on the western hill-slopes. Then we reached them after exhausting walks, over the highest ridges, where our path was often lost in the bushes. Again we saw skylit rooms, and clambered with ropes into well-like chasms darkened with the shade of leaves. We might stand on the edge of an abyss without seeing it, and then what looked like a heavy clump of green bushes was the top of a tree rooted far underground.

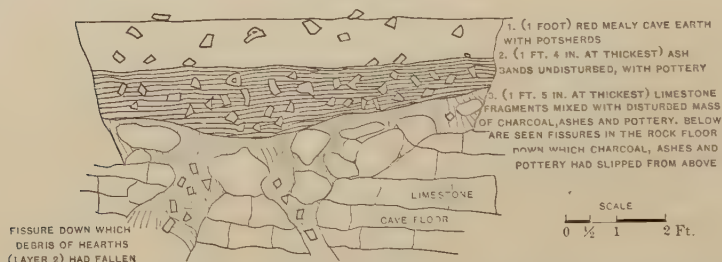
One hot morning our path, after leaving a bushy hill-top, crossed a ledge of bare rock, where our Indians halted and asked us to listen to a clicking sound underfoot, like the tapping of a hydraulic ram. We failed to understand their explanation of the noise, but a few steps farther showed us that we had been crossing the roof of Actun Jil. The noise was the echoed hammer-strokes of gypsum diggers, and when we had entered the cave by an open-

ing, pillared with stalactite, at the side of a fallen area, several half-naked Indians, wet with perspiration, came out of the inner darkness to meet us. One of them held a pointed steel hammer in his hand, with which, as he explained, he had been chipping bits of the stalagmitic wall in the light of small, thin candles. The chips, laboriously collected, were thrown into bags and used, as I learned later, in the making of cement. It was interesting to question the Indians and watch them at work, but outside of this the place had little significance for us. We were standing in a broad, dry chamber, from which one of the side passages led into a very low room lit by a skylight. Tracks of animals were frequent. Whether from the action of fire or the percolation of oxides, the roof of the cave was very black, and at one place we found the fresh charcoal of a recent hearth. At another point there was a heap of small bones, probably of bats. All the passages were very dry, and the Indians, who had brought their calabashes, told us there was no water in the cave. A few potsherds lay scattered among the loose stones of the floor, but, when we could find no stone dishes, no sign of an ancient hearth, and no area on the loose earth adapted for excavation, we gathered up our tools and started again into the forest.

At Chekt-a-leh (Sit-Down Cave), the next cavern visited, the outlines of objects below ground were lost in the darkness, as we stepped to the edge of a shady sink and looked down through the trees. When we had found a convenient series of ledges and clambered into the hole, the blackness turned into a gentle light; the sky was still above us, but the wind had lulled, and the underground grove gave no sound. We heard the flutter of bats' wings under the fantastic roof, and in the darkness beyond saw the outlines of vaults leading away anywhere. Fancying them the ends or openings of other caves that we had seen, we were half willing to believe the Maya story that connected the galleries of Actun Spukil with those of Loltun, at Tabi, and would make of the whole sierra one underground labyrinth. The black floors were bedded with potsherds, and on one of the slopes a loose wall had been built to prevent the downsliding of earth and to form a level terrace. We looked in vain for water; but as it was not reasonable to suppose that the old inhabitants of Yucatan had continually visited a waterless cave, and as several of the now

familiar stone troughs lay scattered about, we inferred that the roof, now dry, had either dripped water in past time, under different natural conditions, or still continued to do so periodically in the rainy season. One of the water-dishes was half filled with earth; another was broken and had slid down the slope by the terrace wall above mentioned. Near them lay two round, unpitted hammer-stones and several large potsherds. On another ledge rested another stone dish but slightly hollowed and showing signs of rubbing in its cavity. It might have been either one of the common water-vessels in process of manufacture, or an unfinished *metate* for grinding corn. We had seen another like it in Oxkintok cave, and found stone pestles afterwards at Loltun. A heap of very large fallen rocks covered the floor of the cave to an unknown depth, and rose like a hill under the skylight. Where a bed of cave earth rested in the hollow of one of them we dug our first trench (nine feet nine inches long and three feet six inches wide), which revealed the following layers (see Fig. 26):

FIG. 26.



Layers of ashes and refuse, proving the visits of man to the cavern of Chekt-a-leh (Place of Sitting, or Lightning), about three miles west of the Hacienda of Yokat, near Ticul, Yucatan. Outer face of Trench 1 (nine feet nine inches long, three feet six inches wide, three feet nine inches deep), cut through the cave floor to bed rock.

The traces left by the first visitors—ash-bands, originally deposited below Layer 2—cannot be studied here. Disturbed, when first made, by the unevenness of the original cave floor and the loose rocks lying upon it, they have been further mixed and discomposed by the down-faulting of the later ash-beds of Layer 2 through the fissures seen below. Explored February 15, 1895.

Animal remains and shells found with the human refuse: bird, dog (first foot), horse (second foot), deer (two species), *Orthalicus princeps*.

Layer 1 (one foot) consisted of red mealy earth, containing numerous potsherds. Some were decorated with scratches, some painted in stripes, and some red and black pieces were highly polished. Many crystals lay among the *débris*, and numerous

FIG. 27.



From Actun Chekt-a-leh. Objects found on the surface, and specimens of earthenware, shells, and bones, associated with the remains of the dog and horse discovered in Trench 1.

nutshells lay on and below the surface. In the first foot, while excavating the trench, we had found the femur of a bird of medium size and the upper jaw of a dog.

Layer 2 (one foot four inches at thickest) showed a belt of undisturbed ash-bands. In these we found bat bones, pieces of charcoal, and frequent polished potsherds, of fine make. There were small fragments of larger bones, among them the first phalanx of a horse, a part of the skull, metatarsal and frontal bones of a small deer, the axis vertebra of a medium-sized deer, and the femur of a large bird, all unearthed in the second foot while digging the trench, and we discovered two hornstone chips, but no arrow-head or finished blade. The ash-bed, much thicker in the middle than at the ends of the pit, contained in its lower part several larger bones, among them a fragment of the jaw of the dog above mentioned.

Layer 3 (one foot five inches at thickest) was a mass of limestone fragments, mixed with charcoal, ashes, and pottery. Its bottom rested, at a depth of three feet nine inches, on the solid rock, but as two fissures opened through this into cavities below, the whole lower part of the deposit had been disturbed. Masses of charcoal, ashes, and potsherds, representing the first fires made at the spot, had faulted downward through the crevices, and on this account it was impossible to get at the true relation of any object that rested in Layer 3 and below the undisturbed ash-bands of Layer 2. The Indians worked slowly; time was too precious to spend in going over shovel and pickaxe lessons with them, and, rather than tax their willing attention with what seemed as hard a task as a problem in advanced arithmetic might to a child, we let them ladle out the earth at arm's length and pile up shovel-blades with their hands. On the whole, the evidence of the cave was disappointing. We had worked upon a pile of downfallen rocks, without penetrating through them, and the bottom of the deposit examined was disturbed. That man had frequently visited the place was proved by the trench, which revealed in its hearths an unusual number of animal bones and a grade of pottery as high as or higher than any yet found. But the digging was inconclusive. The dog-jaw, according to Professor Cope, represented a domestic breed rather than the wild South American species, which did not range north of the Isthmus. The horse, under the circumstances, must have been modern and Spanish.

CHAPTER VIII.

ARCHÆOLOGY IN YUCATAN.

No question in the New World has opened to the student of the past such a mine of interest as the problem of the remains of Mexico and Central America. Early in the century this subject attracted such wide-spread attention in Europe that, inspired by the discoveries of unprecedented ruins and strange manuscripts, the French, about 1830, formed the *Société Américaine de France*, which yet devotes annual congresses to the discussion of ancient America.

A volume, thrilling as a romance, might contain nothing but the story of pre-Columbian manuscripts lost and found, the struggles of antiquarians against what has seemed a hostile fate, and the wild tales of travellers. The chief means of investigation were destroyed at the start, when Zumárraga, Bishop of Mexico, and Landa, Bishop of Yucatan, to the despair of modern students, made such bonfires of carvings, statues, paintings on wood, and the priceless picture and hieroglyph writings on native paper and deer-skin, that only about half a dozen fragments of the Yucatan books have ever been found since. A few native chronicles that the bishops had not burnt were discovered by Boturini, an Italian priest, who for eight years, at the end of the last century, ransacked Mexico to find them; but, having incurred the displeasure of the government, his collection was seized and he was sent to Spain. A malignant destiny must have pursued him, if the story is true that his ship was captured by an English cruiser, and a small remnant of his treasures, still in his possession, taken from him or lost.

What the sum of the injury to science was no one would ever have known, had not Boturini left a list of the seized documents, on the strength of which, Aubin, who was sent to Mexico in 1830 to save what he could find, believed that he had recovered most of the collection. Some of the twice-rescued records were bought

by Humboldt while travelling through the country. Others appeared between 1830 and 1848 among the nine sumptuous volumes of Lord Kingsborough's "Antiquities of Mexico," who, after spending thirty thousand pounds upon his publication, died in a debtors' prison. The famous Maya manuscript known as the Codex Dresdensis, preserved between plates of glass at the Royal Library at Dresden, was bought by Götz in Vienna in 1739. Another original Maya chronicle, the Codex Perezianus, named after the word "Perez" on its old wrapper, is in the Imperial Library at Paris. Another, the Codex Cortezianus, supposed to have been brought to Spain by Cortez, was offered for sale at a high price to the Imperial Library at Paris. Refused there, it was purchased by the Spanish government, and is now in Madrid, along with the Codex Troano, discovered in a Spanish library, said to have been torn from it.

Bernardino de Sahagun, a Spanish Franciscan monk, conceived the original idea of propounding questions to native Mexicans living in 1560, and having their recorded answers illustrated by other Indians without collusion. After toiling for thirty years at this work, his manuscript, the most remarkable European chronicle that had ever been produced in New Spain, was confiscated by the Franciscan order, and an edict from the Council of the Indies was necessary to recover the precious pages. But when the work had been sent to Madrid, the old man died before its publication, and, as if to distress the reader even now, it was lost for two hundred years. Found at last by Muñoz in the archives of a convent at Tolosa in Navarre, it was copied and used by other writers, to come in duplicate into the possession of the Medicean Library in Florence. Here few Americans who look at the maps of the world made by Europeans before the discovery of Columbus know of the existence of the remarkable volumes in Spanish and Latin-letter Aztec, with pictures made from paintings by native Mexicans in the sixteenth century.

Karl Scherzer stumbled by chance on the Popul Vuh, the traditional book of the Quiche Guatemalan Indians, in the University Library at Guatemala, where it had lain forgotten after Francisco Ximenez had found and translated it one hundred and fifty years before. Dr. Berendt, while travelling in Yucatan, found Chilam Balam books, or half-hieroglyph and half-Spanish

compilations of Maya Indians in the sixteenth and seventeenth centuries, now in the possession of Dr. Brinton, of Philadelphia; and Mrs. Zelia Nuttall in 1889 found a Mexican manuscript that had lain unheard of till then in a Florentine library.

The explanations of students throw much light on the picture-writings of the Mexican codices, but no one has yet publicly explained how to read the hieroglyphs proper to the Yucatan books; so that when the Abbé Brasseur de Bourbourg found the manuscript of Bishop Landa's "*Relacion de las Cosas de Yucatan*," together with a key written by the author for deciphering the Mayan hieroglyphics, the thrilling discovery promised results no less important than those that followed the finding of the Rosetta stone. But the key would not work, and the characters remain nearly as mysterious as ever. It is possible that some other antiquary more explicit than Landa may have learned the symbols from Maya priests while the latter yet knew them, but no student since Brasseur has publicly pretended to find so precious a document.

The rescuing of manuscripts and the deciphering of hieroglyphs are only some of the difficulties of the subject. Native traditions have been interpreted in various ways, and, when attempts have been made to trace all the peoples between the United States and the Isthmus to a common source, theories have run wild.

We hear of Toltecs as the forerunners of the Mexicans, migrating to the southward and founding Yucatan; of journeyings of parent races from Florida, from the Mississippi Valley, from the islands in the Gulf, from the Himalayas and the sunken Atlantis, or from a place called Hue-Hue-Tlapalan that has been asserted to be to the north, or to the south, or nowhere.

The ruins show differences as striking and similarities as strange as the legends, till, appalled at the variations of fact and theory, fable and history, the dismayed archaeologist turns away, persuaded that the time has come for comparing what may be learned from books with what may be dug from the ground. In Europe the underlying facts of date, culture, and relation of peoples have been proved by excavation, and, if like results are to be obtained in America, enough has been done and written to convince us that no better field for shovel and pickaxe could be chosen than Yucatan.

The more we learn of the Maya Indians, who probably built the ruined cities of the Peninsula, and who, still inhabiting the region, were found there when Montejó conquered it for Spain in the sixteenth century, the more inclined are we to place them at the head of the list of tribes that inhabited the New World when Columbus came. If written language be a test of intelligence, the Mayas were ahead not only of the Mexican people, but also of the Peruvians. The latter are believed to have made no nearer advance towards writing than the tying of tally-knots on strings; and the Mexicans, while they had invented paper, wrote down their ideas, save in the cases of a few phonetic signs, as children would, by means of pictures; but the Mayas, like the Egyptians, had proceeded beyond pictures to hieroglyphs, where symbols more or less arbitrary stand for words or syllables, and the mind prepares itself to invent an alphabet.

For a time the highlands of Mexico and the Central American region were classed together, and it was not realized until the middle of this century that the ruins in Yucatan, Chiapas, Honduras, and Guatemala not only surpassed everything on the high plateau, but all other structures of the kind in either continent. The ancient walls of Peru were more massive, the earthworks were more elaborate in the Ohio Valley, the mounds were higher in Mexico; but the painted stucco and carved symbolism that covered the temples at Uxmal, Copan, Palenque, and Chichenitza exceeded all comparison. Waldeck in 1830 and Stephens in 1841 astonished the learned world with accounts of these strange, grotesque structures hidden in the poisonous thicket. The forest, concealing them from casual eyes, added to their mystery, and the mistaken story, corrected by Stephens, gained credence that the Spaniards, finding them deserted in the sixteenth century, could learn nothing of them from contemporary Indians. The whole country, from the Gulf to the high Cordilleras, is full of them. Berendt's map of Yucatan is dotted thick with signs for ruins. You can hardly drive five miles over the eastern roads without seeing a crumbling mound of stones exposing the walls of a vault. Charnay found the so-called Lorillard City in the valley of the Rio Passion (in Chiapas) before 1885. Maler, of Ticul, makes frequent excursions into the wild thickets to find new temples, palaces, and towers, and what the great reaches of

unexplored wilderness south of Lake Chichankanab have in store for us no one yet knows. Revealing its wonders by degrees, the ever-present forest, matted with dead leaves, always has obstructed and always will obstruct investigation in Yucatan. The hot and thirsty traveller loses his way. The searcher becomes confused. The excavator knows not where to work. When he does, digging is not easy in the stony soil.

Much might have been learned on the surface of cultivated tracts had the henequen fields of the North been less obscured by stones and thorns, and the whole range of relics from washed-down village-sites might have been gathered on the shores of rivers had rivers existed. As it is, little is known of details, while a few general facts strike everybody. One of these is the

FIG. 28.



Workshop of ancient dressers of building-stone on the floor of the cave of Oxkintok.

enormous number of elaborately dressed stones that scatter the surface everywhere. The verandas and stairways at Calcehtok and Yokat, the pavements at Opichen and Muna, and the colonnades at Ticul are built of square-dressed blocks, not made for the purpose, but taken from the ruins. We saw stone figures

built into Spanish walls at Tabi and Uxmal and along the roadside near San Jose, and "elephant trunks," pillars, crosses, friezes, and borders of worked stone littered the ground near Uxmal, Labna, and Oxkintok. How they were made is a mystery, and no one has yet solved the problem which we encountered at the cave of Oxkintok, and afterwards at Actun Lara, when we found workshops where this carving had been done, but searched in vain for hardened copper, flint adzes, round hammer-stones, or bruised fragments of limestone. At Oxkintok the stone-pile under the skylight was partly composed of broken water-dishes and square blocks of dressed stone, such as were used in facing the apartments of the ruins, and the more we hunted about the spot the more convinced were we that the secret of their manufacture, indeed the secret of all the stone carving of the ruins in Yucatan, was somewhere within the cave. We had found a stone-dresser's workshop. Whoever had squared the blocks and cut the water-dishes had known how to carve the elaborate stone designs of Uxmal and Labna. The tools used at the ruins must have been identical in character with those used in the cave, and we had found an opportunity of settling the question by discovering the fragment of some kind of chisel, associated with chips, at the spot. We searched, however, in vain. To test Mr. J. D. McGuire's proposition, that most of the stone carving in the Stone Age was accomplished with hard, round hammer-stones, we looked carefully for hammer-stones, but found no signs of one. If the work had been done by random fragments of the parent rock, cast aside when dulled or broken, then the rubbish-heap under the skylight ought to have shown many such fragments, blunted by pecking, but we could not discover one, and though the deep peckings on the blocks indicated a pointed instrument, we saw no trace of a fractured stone chisel. Our minute search, though it produced no positive result, seemed almost conclusive against anything so common or easily broken as hammer-stones, natural fragments of rock, or flint chisels; and left us to speculate about pointed tools of diorite, nephrite, or hardened metal, carefully preserved by the workmen, and rarely broken or lost. Experiments showed that when we cut through the outer crust of these damp limestone blocks the inner portions worked easily with an iron hammer, and, as the modern Indians at the haciendas use

pointed iron hammers to carve the pillars of the colonnades, it is possible that some tool as simple in form lies at the bottom of the mystery.

Another striking fact in the archæology of Yucatan is the great preponderance of pottery over all other ancient utensils or tools of human make, a superabundance of earthen-ware that has already characterized museums and collections no less than it has the results of our own work. But its true proportion to the full range of ancient handiwork will not be known until more digging is done. One reason why it is so common is because much of it has been gathered in ancient cisterns, and these are easy to find and excavate in Yucatan. Perfectly round holes in the ground, often seen in the thickets near the ruins, disclose circular, plastered walls, swelling, as you look down, like an ink-bottle. Several feet of rubbish rest upon mortared floors beneath, and in this *débris* many of the perfect vases that adorn museums have been found.

Mr. Corwith discovered five cisterns near a mound at Rancho-Chumul, three miles east of Tabi, and excavated and described one as follows: The bottom diameter was about fifteen feet. Four feet of rubbish lay on the floor, ten feet from the top of which was the circular orifice down which he had descended by a rope. In the middle of the *débris* a pit five feet long and three and a half feet wide was dug down to the plastered bottom.

The first foot showed bones, identified by Professor Cope as those of birds and rabbits, lying on the surface. The earth, which was composed largely of decayed vegetable matter, contained very few potsherds.

The second foot and the third foot showed very few bones and potsherds in the black earth, while

The fourth foot was composed almost entirely of a mass of pottery resting on the plastered level floor of the bottom.

Among the bones of the third and fourth foot were identified those of man, together with the remains of a lizard, bird, frog, and carnivore, representing creatures who had fallen into the death-trap since its construction, and hence, together with the thickness of the rubbish, offering a sort of rough estimate of the time elapsed since the Maya epoch,—one foot of potsherds for the time of the cistern's use; three feet of mould for the empty after-time.

FIG. 29.



From an ancient cistern at Chumul, one of five close together and near several mounds, two miles south of Tabi.

Potsherds and bones dug out of the rubbish layer resting four feet thick on its plastered bottom, and comprising one foot of vegetable mould, with bones of animals on top, representing time after abandonment of cistern. Three feet of potsherds and rubbish, with human bones below, representing the time of use of the cistern and occupancy of the surrounding ruins.

The jars (see Fig. 29) showed various forms, and many, almost perfect, had been probably dropped by the old water-carriers in the deep water and never recovered. We failed to find, however, any of the miniature vessels, said to have been used by children as playthings, sometimes discovered at these places, where the fictile remains are far more abundant than in graves.

Graves dot the forest near the mounds, but are hard to find, since the rows of stones which once marked them have been scattered, except in the wilder regions. Buried in them, at a depth of about three feet, vases adorned with hieroglyphs are often found, which with the skeletons sometimes rest in rude stone coffins, but oftener in the earth. The majority of the burials are simple and primitive; and Herr Maler, the archæologist, of Ticul, informed me that valuable funeral trinkets are rare. The general facts here cited and published, with his kind permission, recall a pleasant conversation with him one evening at Ticul. Time hurried too fast to ask all the questions I wished to ask of a lover of archæology, who, coming to Mexico with Maximilian, had been in the country for thirty years. Night took us away before I had begun to hear, in brief outline, the story of his long experience with the questions that interested us, and glance at notes, specimens, and photographs, illustrating journeys into the wilderness, and the discovery of towers and temples that no white man had seen before. He thought that the pot-making process of the modern Indians would throw much light on the ancient manufacture, but had found no trace of the potter's wheel in the old specimens, and believed that many of the vases had been made by smearing clay over the constricted calabash, and then burning out the rind. After I had examined several perfect specimens of the broad-mouthed ancient water-vessel common to all Yucatan, and very distinct from that now in use by the Indians, he showed me a jadeite tube, a small ball of polished stone, several discoidal stones furrowed on the surface and grooved on the periphery, a number of polished celts of syenite, well sharpened, and some earthen stamps with scroll designs, used, he thinks, for printing colors on cloths. To account for the extreme rarity of arrowheads (only one specimen of which he had in his collection), he supposed that the old Mayas had lived mostly upon maize, rarely killing game for food, and having no domestic animals

except the dog, of which he thought several breeds had existed in ancient Yucatan.

The two or three Yucatecan species of monkeys had often been copied on pottery, and certain vases found in the *débris* of mound chambers showed figures imitating tigers. Small human heads of earthenware or stone, broken from larger figures or vases, had belonged to most collections that I had seen from the region, and Herr Maler's specimens had been found in all parts of the Peninsula. In their mocking, apelike smirks seemed to flash at times an embodiment of Yucatan's mystery. No opal or talisman of sinister import could have worked upon the fancy more than the features of one of these faces, small, finely worked, but diabolical. It was the relic that I coveted most, and Herr Maler's story added to its interest when he told me that he had got it from an Indian sorcerer at Bolanchen Ticul.

CHAPTER IX.

OVER HILL AND DALE.

THE gloomy chasm of Actun Xmak (Covered Cave) lay about in the mid-sierra, four miles northwestward from the hacienda of Yokat. Where the way to it led into a secluded valley a thicket had overgrown the path, and the cave was so hard to find that

FIG. 30.



Actun Xmak.

our Indians lost their way and ransacked the woods for it for twenty minutes, signalling each other with loud birdlike cries. The hole was full of trees, and these, treacherously concealing the abyss with a pyramid of close leafage, caused the horrible accident which darkens our memory of the place. Stepping cautiously around the brink, we found a hole in the crust, and through it, with the aid of a rope, reached the bottom of a shady rotunda, two hundred and fifty feet in longest diameter. The formidable fallen masses of porous limestone which composed its irregular floor rose like a hill toward the centre. Wasps' nests hung from the ceiling and swallows dived in and out of the dark.

In the red dust we saw the tracks of small animals, and near the entrance to down-reaching galleries counted five circular structures of loose stones, built as shooting-blinds by the Indians. Though we failed again to discover falling drops and the dry stalactites seemed to have stopped forming, even during the rainy season, the place showed the usual tokens of the ancient water-hunter. Again under the sombre shelters we found the familiar hearth-sites, with pottery, and near them two stone water-dishes. But though certain that the latter had been made upon the spot, we ransacked the floor for the tools or chips of the stone-carvers, in vain. Then, close to one of the dishes, we dug our first trench, four feet six inches long, three feet wide, one foot seven inches deep at the outside, and one foot two inches deep at the inside. Its sides, scraped clean, revealed the following subdivisions:

Layer 1 (six inches) showed cave earth, with potsherds of the usual surface grades, red, polished, or decorated with scratches. Under it

Layer 2 (eight to thirteen inches) was composed of a distinct bed of ashes extending the full length of the trench. It contained the bones of several species of birds and two kinds of deer, small and medium-sized, fragments of crystal, potsherds of the usual type, and two coarse round hammers made of hard limestone. The digging of the second foot brought us to the bottom of the whole culture deposit, and we struck solid rock at one foot seven inches at the outside, and one foot two inches at the inside of the trench. There was a small hole in this hard floor, and a portion of *Layer 2*, resting on the rock, had slidden down into it. At another place a film of undisturbed yellow cave earth,

Layer 3 (two to three inches thick), full of crystals, lay between *Layer 2* and the ledge beneath. Disappointed at the shallow depth of the rubbish at this point, we hunted up another earth-covered area on the rocks and started *Trench 2*, about ten feet above the place last examined. We had hardly begun to dig when we were again brought to a halt by the solid ledge at a depth of one foot. Most of the pottery was of the rougher types; one sherd was painted, and there were black and red polished pieces and fragments decorated with incised lines. The red ware ran from the top to the bottom. No ash-bands were revealed

on the side of the trench, and no reasonable subdivisions could be made of the layer, which appeared homogeneous throughout.

The results at both trenches had been the same. This cave, like Actun Jeh, had shown us one culture layer, and one only. Granted that the depths of the trenches, one and one and a half feet, was too small to have allowed us to discriminate two epoch-denoting layers at the spot, one above another, if two had existed,—still, had such been the case, we ought to have found a mixture of objects resting on or near the ledge which would have given a peculiar character to the lower part of the deposit at least, for it did not seem possible that any earlier or diverse people could have deposited their rubbish at these caves without intruding signs of it into the earth exposed by our digging. As far as we had gone this reasoning was satisfactory, but we had not gone far enough. Here again, as at Actun Jeh and other caves, we were confronted with a serious doubt. We had been working in hollows on the surface of a pile of enormous masses, fallen down from the original ceiling, and it was certain that we had not reached the bottom of the cave. What, then, did our work mean? Were we wasting time scratching at shallow depths on the surface of the stone-pile? Were we unfairly shirking the toilsome weeks required to blast down to the true bed-rock? These questions remained for the present unanswered. We preferred to leave their elucidation to subsequent work, resting content with the probability that we had missed nothing after all under the fallen crusts, for, as they had originally filled the present orifice of the skylight, the cave may have been inaccessible and must have been pitch dark and unfit for the haltings of men before they fell.

I had been accustomed to see members of our party climb the trees at the skylights of previous caverns to cut down and carry away for their animals the leafy twigs. Here the clashing of flax-knives and the rustling of leaves overhead reminded me from time to time of two young Indians who had followed us to the cave, and were swaying the slender branches above us. They had taken off their sandals, and were climbing like monkeys from tree to tree, or stepping out upon the rock crust at the brink of the hole. One of them had just done this, and, kneeling to grasp a pile of cut boughs in his arms, was about to tie

them with a rope ; his head was buried in the leaves, as swaying the mass and straining to clutch its full circumference, the treacherous brink betrayed him. I heard a loud rattle of branches, and looked up to see his figure shoot head foremost into the air. In a second he lay motionless on the rocks, near my feet, and in about ten minutes his heart had ceased beating. His companion looked sadly on, but without expressing his feelings, and then hastened away to the hacienda, while we lifted the body with our rope and laid it on a ledge above. Some hours passed, and then a band of friends came in various directions through the woods ; a few of them climbed down the cave, and one, approaching the spot, carved a cross on the bark of the nearest tree and scattered earth on the fatal stains. The sun was setting while others made a litter of a blanket stretched between four boughs, and, placing the body on it, turned homeward.

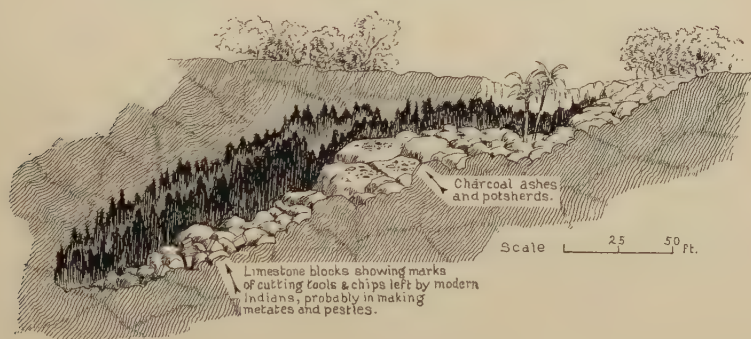
It had been our delight at Calcehtok, by way of evening refreshment, to stand under a streaming spigot, but at Yokat we had the pleasanter privilege, after our hot tramps, of plunging into water-tanks large enough for swimming. After these baths, dressed in the cool muslin sacks and canvas trousers of the natives, there was a temptation to walk about the neighboring orange-groves in bare feet, but the sharp stones soon taught us the use of the sandals, strapped between the toes and over the instep, worn by the Indians, and I provided myself with a pair for evening strolls. At Yokat too we learned the full value of tobacco-juice as an antidote for the most serious annoyance in Yucatan,—the *garapatas*. Small as pin-points or large as fleas, these biting, poisonous, flesh-burrowing pests set your blood on fire everywhere. Feverish itching, as of the breaking out of a sudden rash, was generally accounted for by the finding of a dozen of the small kind crawling upon you before they had begun to bite or raise lumps. By keeping in the middle of broad roads you might avoid them, but there was no use trying to escape them on narrow paths, where they fell upon the pedestrian from weeds and bushes. When there was no path at all it was worse, and there the Indians rolled up their loose white trousers to the thighs, and on getting through scraped the insects off their bare legs with grass. Our first effort on reaching a cave was to find a wisp of weeds and brush clear trousers and leggings ; then,

stripping to the skin, to kill every one of them by a sponge soaked in tobacco-juice and rubbed from head to foot.

There was little more to be learned from the caves near Yokat. One intensely hot room on the way to Actun Lara, entered by a well three feet in diameter, had no name. The woods had been cleared off above it, and the worn and broken stalactites seemed to have ceased forming a long time ago. The down-sloping floor, covered by a single mass of fallen rock, was everywhere unfit for excavation. I could find neither signs of animals nor charcoal or potsherds, and, after noticing a few wasps' nests hanging near the entrance, and filling a box with a specimen of a black deposit protruding from a fissure about thirty feet down to the left, I climbed out of the stifling hole with a breath of relief.

Actun Negro, entered the same day, February 17, 1895, by a rope, through a skylight, showed traces of charcoal and ashes in its rotunda, one hundred and fifty feet in diameter, but there was no water to be found anywhere, and a forbidding pile of rocks on the floor discouraged excavation, as before. From these loose masses several trees, flourishing in the moisture, rose through the skylight, hiding with their umbrella of polished leaves the gulf into which a cow had fallen, leaving its bones to whiten on the stones below.

FIG. 31.



Actun Lara (Lara's Cave).

Actun Lara (Lara's Cave), a league and a half to the westward of Yokat, balked us again with a heap of fallen rocks, filling half the rotunda, so that ingress was easy over the large sunken area and down their slope. Again there were thin

cakes of hearth refuse on the ledges, again the familiar shooting-blinds, and, as at Actun Jeh, the tool-marks of the gypsum-chippers on the walls; but no water-dishes were found. We would have soon left the place had not an unexpected sight upon the floor thrilled us with the hope of a long-wished-for discovery. Down in the twilight, close to the bottom of the rocky talus, lay several pieces of worked stone, which on examination proved to be not finished, but only partially dressed; and when we noticed what we had never noticed before, a heap of chips lying near them, the solution of the problem of ancient stone dressing in Yucatan seemed to have been thrust suddenly before us. We began to look at the stones more carefully: some were blocked out into long thin rectangles; some large masses were rudely worked square, though none had the familiar shape of the square blocks seen at Oxkintok and used as face stones in the ruins, and, while the chips lying on the surface were weather-stained, those just beneath them, in the loose heap, looked as fresh as did the under side of the worked pieces, whose tops, exposed to the air, were tinted bluish-green with lichen. The tool-marks upon these showed long, deep incisions, as from the point of a steel instrument, and when we found a heavy mass, with the three rudely blocked-out legs, or points on its lower side, of a *metate* (stone mortar still universally used in Yucatan for grinding Indian corn), all the conditions of the site were explained. Just below the worked blocks a thin crust of charcoal, ashes, and potsherds, containing the very long upper molar and lower premolar of a horse, the end of a tibia of a deer, and the head of a rib of a large mammal, could hardly have been referred entirely to pre-Columbian times, but the dressed stones and the chips, as one of our Indians told us, were the work of some modern Maya, who had come there to make *metates* with an iron hammer in recent years. Once more baffled, we climbed up the sides of the sink, turning to take a last look at the place, just as two large white birds flew out of the cave into daylight.

CHAPTER X.

UXMAL.

THESE daily walks, by hill-paths worn smooth by hoof and sandal, by slopes fronting to the blue northwest, by high ledges where the wind freshened, by tangled thickets and shallow valleys, opening upon the caves, brought us to know Yucatan as

FIG. 32.



View from the Dwarf's House at Uxmal.

only a foot-traveller can. But our search for twenty-five miles along the hills had not been conclusive. Time was short, and work doubtful in character and amount lay ahead, so that misgivings beset us when, leaving the direct line of investigation, we

turned toward a malarial plateau behind the ridge to see Uxmal and Kabah. Luckily the weather had turned cloudy, or the collapse in store for us a week later might have overtaken us on the day when, with camera and note-book, we climbed the break-neck steps of the Dwarf's House at Uxmal. I had not expected to see ruins set high against the sky, like German robber castles, but from the top of the Dwarf's staircase we looked out through a broken window upon a region of conspicuous artificial hills. Each was capped with crumbling walls that showed white against the plain which, with its blue bush, reached northward towards a row of wooded domes, deeply tinted by the clouds. Windy currents rushed over the high ground, as, stepping carefully upon broken stones, we turned a dizzy corner and entered a vaulted room; but when we had clambered down again all was lost in the thicket. If this was a city, where were the streets? Where the squares, the dwellings, or their sites? A mantle of bushes hemmed us in, and dry leaves hid the ground. Here and there previous explorers had burnt openings to clear the view, but the growing thicket was undoing their work. One by one the ruins rose suddenly before us out of the tangle as we followed the winding paths. One windowed wall, called the "House of Pigeons," stood alone, like the front of an unfinished palace. From the top of a mound, reached by a ladder, a structure corniced with stone figures of turtles rose upon heaps of fallen masonry. Where a high earthen platform looked out toward the mountains, the "House of the Governor," an immense building with fantastic walls, enclosing rows of vaulted chambers, shut off the sky. Strange masks with grotesque eyes frowned from a maze of symbolic ornament in stone, or lay in confusion underfoot, where whole sides of the wall had fallen down. At another place, "The Nunnery," the surprise was reserved till we had passed a narrow arch through a wall overgrown with bushes. Then, as the outside of the structure had seemed plain, the most remarkable monument in America broke upon us unexpectedly. We stood in a large court-yard fronted with fantastic forms in stone. Grinning jaws with sharp teeth, carbuncle eyes, "elephants' trunks," grotesque noses, hideous caricatures of men and animals, and, above all, the twisted body of the rattlesnake, with mask and diabolic head-dress, composed the

features of an unknown allegory. The names given by modern visitors to this and other buildings had an idle and meaningless sound, while thought forgot size and architectural effect. The weird symbols prevailed over all criticism, and a slow fear crept over the mind as of something malevolent, blending with the bloody themes of the codices. It seemed to rise from the perilous forest around us and haunt the air, reaching back into our wanderings and tingeing the mysterious country with a color as indescribable as the hues said to be seen in the eyes of serpents. We were in the New World. Our voices echoed in the nineteenth century, but potent nature in a strange garb effaced all token of the commonplace and confronted us with the fascination that had turned the brains of students and betrayed with fancies the path of the searcher.

Stephens had seen carved wooden lintels over some of the door-ways, but, though we saw enough lintels of wood to enforce his argument that the ruins were not very ancient, we found none carved. These facts and further investigations are beginning to set a comparatively modern date to the coming of the peoples who built these structures, though when we ask for details there is no answer. The fever and the jungle jealously contest each fact gleaned by explorers who dare to camp in the forest at the risk of their lives. It is begging a great question, after all, to learn that the Mayas had come to Yucatan after having already developed their culture elsewhere. Pushed farther back into the unknown, this problem at last merges with that greater one, Whence came the American Indian?

There was no hum of machinery and chatter of voices, no barking of dogs and gobbling of splendid turkeys, as we reached the hacienda of Uxmal. Faces peeped at us through the doors of thatched huts when we drove across a common toward the large house, where no one was stirring, and where on an upper stone veranda the wind whistled through the open doors. I heard a squeaking noise, and looked from a flight of stone stairs around the corner. A tree threw its shadow on a platform of masonry, and there a mule, fastened to a revolving beam, plodded on to the switch-cuts of a barelegged Indian. From one of those deep wells that had been blasted through many yards of rock a stream of water fell through a stone spout into a trough. As

I looked I heard the noise of an opening gate behind me, and an Indian girl, straight and graceful, stepped across the pavement in bare feet. Her features seemed pale against the deep blue of her scarf, as, passing me and rolling up her white sleeve, she set an earthen vase on the stones, while I felt a kind of pity for her as the stream filled it and ran over. This water was the poison that had three times depopulated the hacienda, that had destroyed children and cattle. Travellers had said there was fever in a draught of it, and I wondered what the girl dared do with it. Was she exempt from its curse? Was it hers by inheritance, to drink as her ancestors had drunk, who thrived upon it when they built the ruins? I listened awhile to her soft voice talking to the driver, and looked, longing to speak, till at last, catching the jar under her arm, she turned away. For a moment the impulse came to call after her, hoping to see her stop, turn, and smile; but I only stood watching till the gleam of white garments and the fascinating movements were lost behind a wall. Turning towards the stairs then, I saw a small man in dark clothes waving his hat in the friendliest manner on the veranda. He was the chief engineer, and we were his guests. Supper would soon be ready. Our mules would be cared for, and a room and hammocks provided at bedtime. Presently several assistants appeared, a table was set, and one chile-seasoned dish after another brought in. Where the fine claret came from we were never able to learn, but, fully enjoying it and our pleasant company, we talked till long after candle-light, learning many things from men whose services were everywhere in demand, and who, travelling continually from one hacienda to another, knew the hill country well.

The whole region eastward of the mountains seemed higher than that we had left at Yokat, but it was hotter, and the underbrush was thicker, though the word *jungle*, in an Asiatic sense, could not have been applied to the all-pervading thicket, which, save for the absence of wet ground or signs of moisture, did not look unlike an unusually tangled swamp in the United States. Had the boughs been leafy, we would have walked in a cool shadow, but palms and their shade were missing, and few bushes had their foliage. We saw no large succulent stalks. There was no display of orchids, no miasmatic steam, or loud hum of insects. Our heavy leather leggings, made to

protect us against snakes and poisonous reptiles, were soon cast aside, as we followed Indians who went barelegged through the thorns. We heard no cries of animals. Now and then the iguana, a very large lizard, rattled through the leaves, but only two snakes were seen up to February 20 anywhere, and mosquitoes were not an annoyance, except at Merida, though even there they were less vicious than those at home.

As we jolted in *volans* towards the small hacienda of Santa Ana, the last of Señor Escalante's estates in our way, we had mountains behind and before us, spurs comparable in shape to the letter U, and, though Berendt's map did not show the fact, the ruins of Kabah seemed to lie over against a range of hills and on the northwestern edge of the plateau. The cloudy days were past and the mid-day heat was intense when we drew up at a shadeless thatched cabin near a chapel, some empty water-tanks, and a small overseer's house of stucco. There, after the hammocks were swung and the pipes lit, we spoke the thought uppermost in our minds when we wondered whose hospitality was to brush trouble from our path in the future, and what lay beyond us in the feverish country.

Much to our surprise, a graceful dog, with smooth gray coat and black spots, walked complacently into the room and lay down on the floor. We knew him at once as one of our old friends at Yokat. He had caught sight of us in the streets of Ticul, and followed us for better or worse. Flattered at the compliment, we soon refreshed him, as we refreshed ourselves, with a bath of insect-destroying tobacco-juice, and then fed him as he had probably never been fed before. His name, Monte, decided by vote, was soon changed to Peck ("dog" in Maya); and finally, when Mr. Darlington, with the consent of the engineer at Yokat, brought him to the United States, to "Maliese."

Travellers tell of a breed of hairless dogs still existing in Mexico, which early accounts describe as nearly exterminated by the Spanish conquerors, who used them for food. We had seen none of them, much less of a stranger species, sometimes supposed to have been indigenous to ancient Yucatan, which, if we may believe the carvings of dogs made by Spaniards in the sixteenth century on Governor Montejo's house in Merida, seem to have had humps on their backs (see Fig. 33). Maliese's blood was

mixed, and its ingredients, if acclimated after several generations in the *terra caliente*, were no doubt originally European. His act had won our hearts, though there was nothing remarkable about him but his sagacity. In choosing us for his masters he

FIG. 33.



Decorative carving made by Spaniards in the sixteenth century over the gateway of Montejo's house at Merida, sometimes supposed to represent an ancient breed of Yucatecan dogs.

had wisely escaped from the hard canine life of Yucatan, where ill-fed, ownerless dogs are present everywhere. Young Indian children play with puppies, but no one else seems to train, fondle, or feed a dog. On the verge of starvation, they swarm in kitchens and dining-rooms, where cooks and servants strike them unexpected blows when they are asleep.

CHAPTER XI.

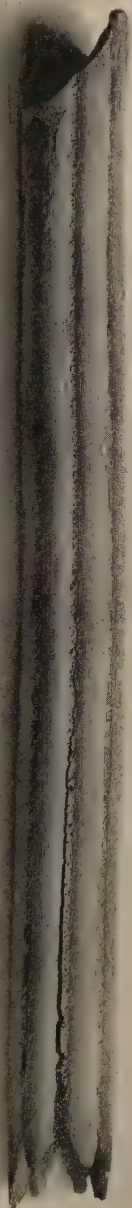
KABAH, RANCHO CHACK, AND TABI.

THERE were three things to be done at Santa Ana,—the first, to explore the *cenote* at Rancho Chack; the second, to see the ruins of Kabah; the third, to ransack the woods for a workshop where the carved stones of the ruins had been quarried and dressed.

The first quest took us a two hours' hot walk along a wood-path, where in a wild place under the hills a sound of rustling bushes dogging our footsteps apprised us of the dangerous nearness of a herd of peccaries. Some of the enthusiastic sportsmen of the party, who, prepared for a wildcat, had advanced into the thicket with cocked revolvers, appeared disappointed as we formed in file again and pushed on in silence towards an opening in the woods, overgrown with long, dry grass, and planted at intervals with small trees. Its barren silence suggested one of those wastes named "Indian fields" in the Pennsylvanian woods; but we searched it and another clearing which followed it in vain for traces of ancient village life. Then, hastening on, we reached two of the cabins of Rancho Chack, and there, heading the party with a long stick to drive off dogs, I passed close by the doors, where Indian children rolled on the earth and white-robed women sat in hammocks, clean as if by a miracle, in spite of the mangy dogs, chickens, and pigs that went in and out.

The cave well was in a clearing several hundred yards away, near a few palm-trees, and in plain sight, not one hundred paces from the opening, stood an old stone mound, near the base of which Mr. Corwith found one of the familiar water-dishes. The entrance to the cavern was smaller than that of any we had yet seen, and, by way of a novelty, blew out a gust of cold air, like the blowing caves in Tennessee. The candles went out at

FIG. 35.



*Cactus torch
used by modern Indians
Lolun. Found on surface.*



*Cactus torch
used by modern Indians
Lolun.
Found on surface.*



*Torch of grass
stalks, used
by modern in-
dians.
Rancho Chuk.
Found on surface.*

the wind stopped. Winding outward, a well-worn gallery soon grew intensely hot, and not without some danger of fainting we followed it, often crouching and sometimes crawling, for about nine hundred irregular paces. This brought us to a final descent, where a still pool of clear, lukewarm water filled up the entire tunnel and stopped us. The whole appearance of the place showed that Indians had for a long time clambered into it to get water, and still continued to do so. The path was sooty and the roof blackened with smoke. Along the gallery I found charred sticks, curled rolls of twigs, probably used for ladder-making, and on the ledges constricted water-calabashes. Near these I gathered several bundles of twigs tied together with hemp strings, and used by the Indians for torches, and here and there noticed fragments and rims of pots, which the Indian guide said were modern. The ragged walls of the fissure showed little evidence of water wear, and I heard no falling drops and noticed no stalactites. The cave had a few chambers or enlargements of the passage about twenty-five feet in diameter by fifteen in height, but would have been best described as one winding narrow gallery from five to eight feet high. Hard as it would have been to find originally in the forest, the old Mayas who had built the mound near by must have known and used it. Nevertheless, no important results could have followed excavation in any part of the hot galleries. A few blows of the pickaxe would have bared the solid rock, and piles of earth along the ledges showed that such rubbish as there was had been continually thrown about and scratched aside to deepen the path.

If we had jumped into the pool with our clothes on, our thin garments could not have been much more soaked than they were when we reached the surface. The gust of rushing air felt like an icy blast, and drove us away from the cave to sit down and rest awhile in the sun. Then without waiting for the cool of evening we turned homeward.

The stifling subterranean heat of Rancho Chack and the afternoon walk were followed by a chill and an attack of weakness that ought to have warned Mr. Darlington and myself against a visit to Kabah two days later, but it did not, and after another long tramp through the thicket we stumbled listlessly about

the ruins, too weak to carry out our proposed plan of searching for a quarry of building-stone and missing a distant mound with stuccoed figures and a solitary arch seen by Stephens. Again crumbling walls rose out of the bushes on mounds of loose stones. Which of the light-gray structures, with their windowless, vaulted chambers inside, were temples and which palaces must be decided by excavation. As at Uxmal, so at Kabah, there was no use trying to get an idea of the original city, if it

FIG. 36.



Remains of a vaulted room in a mound at Oxkintok. Showing the method of vaulting and wall construction in the ruins.

was a city. The stone pathways connecting the buildings, the open squares, the cisterns, the remains of commoner dwellings, if made of wattle, clay, and thatch, had been hidden by the undergrowth. Only after climbing mounds could anything be seen in a general way, and then the vestiges set upon tumuli were indistinct in the distance and half hidden by trees. To see them near at hand we squirmed through the dry thicket, which seemed to grow denser, thornier, and more full of wood-lice, as

the grotesque door-ways glimmered through the boughs. Again we suddenly stood under low columns of outlandish shape or cornices such as no modern architect has dreamed of. The more we examined the walls the more we wondered not so much at their antiquity as at the fact that they had not already crumbled to the ground. A facing of blocks, shaped like the letter V, pushed mosaic-fashion into a central pudding-like concrete of stones and mortar (see Fig. 36), was a weak form of construction. Neither were the face-stones interlocked systematically, so as to "bind the joints." Everything was slipping out of place. No wonder there were fresh cracks in the walls, that whole façades had tumbled, and that overseers had spoken of structures losing their identity in twenty years. As we ventured under the shade of a door-way whose lintel looked ready to tumble on our heads, the air seemed cold, but the heat of the homeward walk was intolerable. A few places where leaves had thrown shadows on the path were missing in the afternoon, and from these, wandering cows, seen in the morning, had turned away into the forest. Searching there in vain for shade, we ate our dinner in the sun.

When dizzy and exhausted we reached home, the effects of the imprudence were soon apparent, and a dull period of weakness, chills, and headache paid the penalty of this mid-day walk. Three days at Santa Ana in hammocks, a jolt in a volan to Tabi, a midnight arrival among yelping dogs at the great sugar hacienda, and another week of headachy rest in a large dark room were for some time the only incidents worth mentioning after our visit to Kabah.

Tabi had a great court-yard, where in the morning the hissing of steam, the rattle of machinery, and the voices and noise of men, mules, *volans*, dogs, and cattle waked us early. There was a great colonnade, with an upper story and terraces, cattle-sheds, palm-trees, a ruined church, a distillery, a *tienda*, and a large, new, American-made crushing-engine, all looking upon the court-yard, with an Indian village beyond. Like all the other haciendas, the large buildings had few furnished rooms, and appeared to be rarely visited by the family of Señor Duarte, though he himself came once a week to superintend the work. As usual the ceilings of the bare, lofty rooms showed close-set *zapote*

beams, interarched with a concrete of stones and white mortar. To make the floors, twigs had been laid across the beams, and thereon mortar, in which several layers of stone splinters, keyed side by side from rafter to rafter, had caked into a firm floor. When the mass set the twigs were removed and the arched underspaces plastered. Where the ceiling of a room was also its roof, the concrete was trowelled on without keying; hence roofs were weaker than floors, and occasioned the well-known objection in Yucatan to children playing on the house-tops.

At Tabi work stopped at the roll of a drum and a bugle-call. Then scores of Indians from the cane-fields, stables, cattle-yard, pumps, tanks, and engines crowded the overseer's door for wages. All night lights glowed from the engine, and the air was full of a savory smell of boiling sugar.

One evening the sound of an accordion brought us down-stairs after supper, to find one of the lower rooms crowded with Indians. We had forgotten that it was Carnival time, and to our surprise saw through the door the dancing figures of masked workmen dressed in fantastic costumes. While the crowd laughed at tricks and jokes, or commented in low tones in the Maya language, the pretty music, played in Spanish rhythm, set our heels tingling. There were girls enough standing near, but, just as we had half decided to waive ceremony and choose partners, the party broke up, and we saw them cross the cattle-yard with torches and enter the village, where the dance-tunes echoed merrily from house to house. Then the cook of the hacienda brought out his guitar and sang, and a negro danced till bedtime. By ten o'clock all the lights in the lower rooms were out, except one at the end of the colonnade, where drums, horns, and muskets hung on the walls, and men kept watch all night, lying in hammocks or stretched upon the bare stones, their heads resting on folded arms. Some of their positions seemed most uncomfortable, but none equalled that of our old waiter on the veranda, who, in spite of guitars and talking, had gone to sleep early in the evening. A narrow ledge of the wall overhanging the staircase was his choice, and there, in sound oblivion, he lay on his back, left leg on the wall-top, right foot on the steps, and head hanging over the brink.

These moonlight nights were so cool that we went out after

dark muffled in our striped blankets. When the girls had ceased carrying water, loud, tremulous cries often filled the night air. Once, to learn their cause, I had stepped stealthily to the well, and there saw three very large toads, who were making all the noise, as they hopped with many pauses down the steps of the tank and came out upon the court-yard.

CHAPTER XII.

LOLTUN, THE ROCK OF FLOWERS.

LOLTUN (Rock of Flowers), with an ancient mound four thousand three hundred and twenty-five paces to the west of it, with Uxmal about seven leagues and Labna four leagues to the north, with Tecax five leagues and Mani four leagues to the east, and Mayapan not much farther to the northeast, could not have escaped the attention of the builders of these cities. Indians carrying dried cactus torches (see Fig. 35) and calabashes came daily to the cave for water, and, steep and difficult as was the entrance, this need must have compelled any incoming people to visit its galleries. Many of the caves previously examined, as remarked before, would have been unfit for habitation in other countries, but the awe-inspiring apartments of Loltun, smooth-floored, well lit, and ever cool and dry, would probably have been chosen as halting-places by primitive peoples anywhere. There may have been several ways of ingress to the cavern, but if the old Mayas got into it by its main entrance they must have used a ladder, as their modern descendants do, for the rock-cut steps miss reaching the bottom by a ledge at least fifteen feet high. When after a long walk across the cane-fields and through the woods we stepped into the yawning well, followed the rock-cut steps and descended the ladder, the sight we saw did not overwhelm us with its grandeur, but stole over us slowly. In a bluish light a mass of leafage, roots, and slender stalks confronted us, where the overhanging black arch made it seem as if we were looking through a water-glass into the sea. Like the garden which Aladdin saw after being sent down an enchanted staircase by a magician, the scene might have vanished suddenly at some ill-advised act, yet I saw no flowers or brilliant colors. Under the arch a stalagmite, shaped like a crouching cat, threw a deep shadow, but no black abysses yawned behind the trees. The



FIG. 37.

Scale 1 100 200 Ft.

Lolitun (Rock of Flowers).

cooler air stirred in breaths about us, touching the leaves as we passed onward to turn into a dark passage to the right, and leave the garden behind us. Then we went down a staircase by two walls and into a sombre chamber, after following which for a time a light broke beyond the gloom, and we stepped into an

FIG. 38.



Cavern of Loltun (Flower Rock). Underground vegetation in large chamber near the entrance.

immense domed room, hung with stalactites and lit by two skylights. No thought of disappointment came with the first glance. The familiar rock-pile lay far out of our way, and there was plenty of soft earth, on whose long, smooth reaches each footstep trod upon ashes or potsherds. The rock carvings we had seen at Actun Ceh had reminded us of the work of North American Indians, but those that marked the walls of the great room at four places seemed rather symbols than pictures. At several places masses of stalagmite had been rudely chiselled to represent human shapes. There were circles and groups of rec-

tangular outlines, but we recognized no hieroglyphs, and failed to see the painted outlines and sitting human figure in color noticed by others.¹

FIG. 39.



Cavern of Loltun. Stone water-dishes placed to catch the drip of stalactites on the floor of the great rotunda. Believed to have been made on the spot with stone tools by ancient Maya Indians, though they may have been recently placed in their present position.

Drops of falling water could be plainly heard when we stopped talking, and, though they had not caused stalagmites at the spots

¹ Señor Maler had previously told me of the sitting figure, but I inexcusably forgot to look for it or visit the inner rotunda which contained it. I had hoped to be permitted to obtain copies of this and two other specimens of painted outlines now at the Peabody Museum at Cambridge, Massachusetts, but the permission was made conditional on the consent of Mr. Thompson, in Yucatan, from whom the curator has not yet heard. The first carving seen by us (Fig. 40) was on the main wall of the room to the left of the

where they fell, the openings of at least four of the thirteen water-dishes lying near had been very much modified by the forming of crusts.

FIG. 40.



Cavern of Loltun. Native carving on the south wall of the great rotunda.

Of all the underground shelters yet seen in Yucatan this was best fitted to answer the question of our search. The secret of

entrance, and consisted of rectangular lines drawn across cartouche-like enclosures. Two other carvings of the same character (Figs. 41 and 43) marked the sides of two large rocks projecting from the floor on the east

the ruins, the chronology of the Mayas, the clue to the paleolithic savage, if he existed, lay buried under our feet. How and

FIG. 41.



Cavern of Loltun. Native rock carving on mass of limestone projecting from the floor in the large rotunda.

when had man first come to Loltun? What changes had come over him during the centuries that he knew and visited the cave? Had religious ceremonies been performed in the weird chambers?

side of the room. We noticed a fourth (Fig. 42) on the side of a rock-mass half-way up the slope towards the skylight. A fifth consisted of pittings and figures on the right wall and at the entrance of a large down-branching passage. A sixth was the stalagmite above referred to, rudely cut to suggest a human face, and fronting the entrance.

Had the rocks seen the diabolic rites of Nagualism? Had men ventured to live here day and night, burying their dead, grinding

FIG. 42.



Cavern of Loltun. Native carving on a large fallen mass of limestone protruding from the floor of the great rotunda below the skylight.

and cooking Indian corn, and wandering with torches into the unknown?

Beyond the great rotunda, three hundred and twenty feet in longest and two hundred and ninety feet in shortest diameter, we reached the third chamber, after a ticklish clamber up a slope

filled with downfallen masses, and there, just under the skylight, two rude seats, like a third seen in the former rotunda, had been carved upon the top masses of the central rock-pile.

Another passage, we were told, led from this into a fourth skylit chamber, but without following it we turned back and into a high gallery that passed out of the great rotunda to the right of

FIG. 43.



Loltun. Native carving on a mass of limestone protruding from the floor of the great rotunda.

its entrance. By way of this the path, scattered with potsherds, passed several pools of drip-water, and soon led into an enormous dark vault whose roof could not be seen in candle-light, and where the way was lost in a mass of immense blocks that covered the floor. I attempted in vain to get around or over them, and then retraced my steps and tried to reach the end of the room another way. Following the wall I found presently that I was walking on a ledge that grew narrower and more

slippery as I proceeded, and when the floor of this began to slope outward I stooped down and crawled. By that time the ledge had turned into a smooth, stalagmitic crust, and had become dangerously steep, while of the height of the ceiling above me or the depth of the abyss below the dim candle gave no idea. Fearing a fatal slip I turned round and crawled slowly towards the entrance, drawing a long breath of relief as I reached the light.

FIG. 44.



Cavern of Loltun (Flower Rock). The Indians are sitting on the edge of Trench 1. The dark passage on the right leads to the entrance.

We had heard that the floor had been seriously disturbed by digging in behalf of the Peabody Museum at Cambridge, Massachusetts, but were agreeably surprised to find that no harm had resulted from the large, shallow trench, sixty-six feet long, eighteen and a half feet wide, and two feet deep, dug along the southwest side of the rotunda. Whether its object had been to study culture-layers or to obtain specimens, its site seemed less adapted for successful excavation than the higher ground at

the north end. No disturbance was visible there, and we began Trench 1, eleven feet long by six and a half feet wide, close against some fallen masses of rock.

What the shovel revealed on the surface of these cave layers had now lost its novelty. The interest lay below. On top we found what we expected. The *first six inches of the first foot*, laying bare well-trodden cave earth, with charcoal and ashes, showed not only signs of the Indian, but of the white man. A bit of leather, a rusty brass-mounted draughtsman's compass, a dull-white chip of flint, lay with sticks of wood, charcoal, small bones, and potsherds, massive or fine, polished or dull. Of these some were yellow and well polished, some brown and decorated with painted lines. In the *second six inches of the first foot* the soil grew redder. There were bones of animals or birds, and a worn flake and knife of flint. Pottery stood in the ratio of about one hundred to one to all other objects.

The *second foot* opposed us with a thick bed of small rounded stones, but the relics continued. With the humerus of a rabbit we found a large fragment of flint that looked as if it had been polished and broken, several flint chips, a stemmed flint knife, and the broken end of a blade. The range of objects of human make had widened. Along with the everlasting potsherds we found more flint than we had seen before, and afterwards in some loose digging came upon two polished pestles and a round ball of stone; but the question of when and how man first entered the cave had little to do with well-shaped or unbroken specimens.¹

These, culled from the mass and set in museums, might well have given a false impression; but the trenches, revealing the true relation between rude fragments and perfect objects, told the truth and nothing but the truth. A chip, a potsherd, a cracked

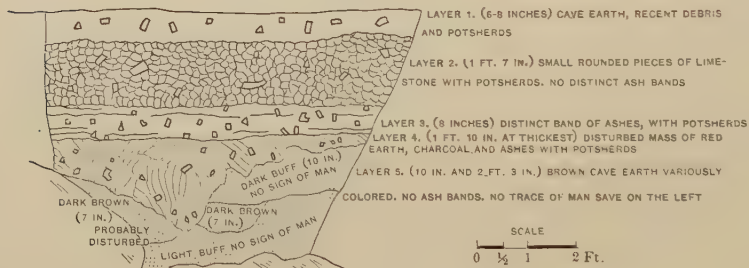
¹ After this trench had been examined, the Indians, out of work for the time, were set to digging roughly into its north side, without reference to the subdivisions. In cutting out an area eight feet nine inches long by seven and a half to nine and three-quarters feet wide, they found a great number of potsherds, one of them brilliantly painted, a number of flint chips, several fragments of flint knives, one leaf-shaped flint blade, a round ball probably made of earthen-ware, the bone of a bear and other animal bones not identified, and two pestle-shaped stones of very hard material, one of them pointed at one end and weighing several pounds.

bone, might answer our question, so we took everything that we found, even bags-full of the varying earth. The stones stopped in the

Third foot, and the cave-earth grew softer and turned red. There was the fibula of a bird and a piece of the antler of a deer in the ashes, but potsherds were rarer. These, sometimes polished and prettily decorated, grew still scarcer and seemed to stop in the

Fourth foot, and in the *fifth foot* when found seemed to have fallen from above. In the red cave earth, which now seemed pure and undisturbed, we found a part of the axis vertebra of a peccary, but no trace of man. We had gotten below one culture-layer at least. Was there another? We had reached the point where we had left off at the other caves, and a keener interest seized us as we prepared to dig a hole as deep at least as that at Oxkintok, when the pickaxe clanged suddenly on solid rock. As shown in the illustrations (see Figs. 45 and 46), we were on the bottom

FIG. 45.



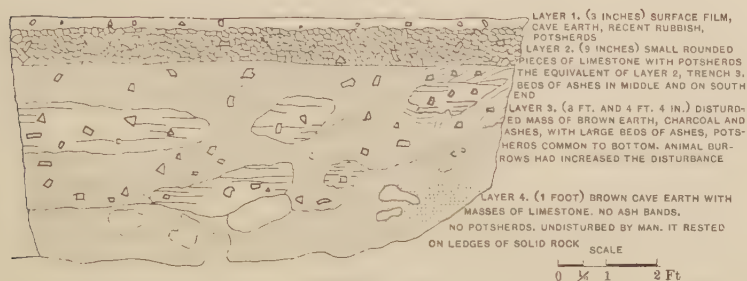
TRENCH 1, NORTH.

Old refuse layers, proving the visits of man to the *Cavern of Loltun* (Flower Rock), three miles east of *Tabi*, Yucatan. Face of Trench 1 (eleven feet long, six and a half feet wide, five feet four inches and four feet ten inches deep), looking north. The evidence is less satisfactory than in Trench 2. The beds of ashes at the bottom of the deposit (Layer 4), marking the time when man first entered the cave, have been disturbed and confused. No finer subdivisions can be made out.

of an uneven ledge. Cleaning off the pure red earth from the rock and paring down the north and west sides of the trench with the trowel, we made the measured drawings here given (Figs. 45 and 46). There was nothing in the whole refuse bed so exposed, with its surface film, its stone layer, ash-band, and disturbed red earth, as described at length in the foot-note; nothing in the

clean earth next below, without human trace, and resting on the solid floor, to surprise us.¹ But the time had not come for con-

Fig. 46.



TRENCH 1, WEST.

Old refuse layers, proving the visits of man to the Cavern of Loltun (Flower Rock), three miles east of Tabi, Yucatan. Face of Trench 1, looking west. Layer 3 shows the time when man first came to the cave. The ash-bands that originally subdivided it have been disturbed and confused, probably by the makers of the fires themselves, and probably also by burrowing animals.

Animal remains found *with human refuse* (from the surface to the bottom of Layer 3): iguana, bird, rabbit, bear (depth undetermined), small deer, man.

clusions. The thing above all others to be certain of now was the solidity of the bottom, and, fearing that our trench might

¹ Having cleaned the north and west sides of the trench, the following layers were exposed. (See Figs. 45 and 46.) We studied them by working horizontally into them and picking out specimens from their matrices with the trowel.

Layer 1 (eight to three inches), a thin film of charcoal and ashes, resting on the surface, contained a potsherd decorated with incisions and several polished red and polished brown pieces.

Layer 2 (one foot seven inches to nine inches) extended around the north and west sides of the trench studied. It was a thick bed of small rounded fragments of limestone, appearing later in the large trench (Trench 2), and whose presence I failed to account for. On the whole, it did not seem improbable that the old visitors to the cave had placed it there. I found in it, as usual, coarse incised and smooth polished potsherds, and then a large cream-colored fragment with painted wave-like decorations. But there were no distinct ash-bands, though when I came to study it more extensively, following it around the trench, I found to the left and in the middle of it hollows full of ashes among the stones. It seemed as if the fire-builders of Layer 1 had scratched holes to build hearths on the stony floor of Layer 2.

Layer 3 on the north (eight inches), a distinct band of ashes, containing all the lighter varieties of potsherds, did not exist on the west face. There it had been mixed and faulted with the disturbed mass below it, but on the north it ran clearly across the exposure (see drawing, Fig. 45), and marked the site of

have come down upon a shelf, and not a general rock-level, we started Trench 2 in the middle of the open floor, where the cave earth should have lain deep, if it were deep anywhere. This trench (see Fig. 48), twenty-eight feet long and six feet four inches wide, tapering to the bottom, brought us to a crisis

a conspicuous hearth. In this mixture on the west face we found the tibia or radius of a lizard.

Layer 3 on the west and Layer 4 on the north (1 foot ten inches on the north and three feet and four feet four inches on the west) was a distorted mass of brown earth, charcoal, and ashes, containing potsherds as usual from top to bottom. It marked the lowest trace of human interference, and reached down at deepest four feet four inches below the surface. Tracing carefully the bottom line of the deposit on the west, I found a fine polished red potsherd, the heavy rim of a pot, a polished black fragment, and a small flake knife finely polished; also a yellow polished sherd with brown painted lines. All these objects lay close to the bottom of the layer, at a depth of about four feet, but their relative position had little significance. The whole layer had a disturbed, irregular look, as if the fire-builders had dug holes and moved about their ashes considerably after their deposition. Animal burrowing had probably added much to the dislocation. There were so few animal remains found that it seemed as if the age test of their bones would have to be given up, and the inference was that the builders of the fires had cooked and eaten little if any animal flesh upon the spot. We had now, save for a slight tinge of discoloration reaching lower, passed the limit of human interference, and it remained to investigate the single band of brown earth that intervened between us and the rock floor. This was

Layer 5 on the north and Layer 4 on the west (ten inches to two feet three inches on the north and one foot on the west), a mass of brown and buff-colored cave earth, thickest against the right side of the north face and tapering to nothing on the left against a sloping rock.

Bands of discoloration more or less blackened by charcoal, seven to ten inches thick, tinted its upper portion on the north face. Below these dark blotches all trace of humanity disappeared. The rock platform underneath sounded solid under the pickaxe, and discouraged all thought of farther progress without gunpowder. Floor crusts of stalagmite, if formed in an open cave, have had, in my experience, a smooth, polished surface; where formed underground I have found their texture porous and of very uneven hardness. The ledge under our feet had neither of these surfaces, but rather the rugged face of original limestone. In sharp contrast to its texture was a hard, polished stalagmitic knob of the kind formed in the open air, which rose from the rock platform against the middle of the west face of the trench, and proved the action of ceiling drip before the mantle of earth had been deposited. On comparing this knob with the surrounding rock-level, it was clear that the latter, if not the floor of the cave, must have been the surface of a large mass fallen from the roof, and not one of the stalagmitic envelopes, such as the Rev. Mr. McEnery and Mr. Pengilly found in Kent's Hole.

in our investigation. Either we should find something new there, or there was nothing new to find in eastern Yucatan. It took the Indians about three days to clear it out and expose an unbroken, solid ledge, at one end of which rose stalagmites, and just over which a layer of clay had been deposited by water in earlier geological times.¹ We had cut through the equivalent of the human refuse layers in Trench 1 to find below them no trace of earlier man. Again we had encountered but one bed of human refuse; below it there was nothing human. It might have been very thrilling to contradict our previous evidence as far as it had gone, but it was satisfactory to confirm it. For some time past, in order to refer to some clear, far-reaching fact that could be depended on, we had to appeal to our work at Oxkintok. The other caves had left us in doubt. Now at last the great question seemed settled, and we had a chain of evidence without missing or broken links. If we went no farther and did nothing else, we had not come to Yucatan in vain.

The remaining work in the excavation was one of detail. When scraped clean the whole eastern face of the trench showed six subdivisions. The upper three marked the zone affected by man, while the lower three, after the most careful search, failed to show any sign of humanity. To the latter we addressed ourselves to make sure, in the first place, whether we had or had not reached the bottom of the cave. The ledge on which we stood, at

¹ Most of the bones from this trench were found in its original excavation.

The first six inches of the first foot showed the upper canine tooth of a peccary and the lower part of the humerus of an opossum.

The second six inches of the first foot contained the jaw and humerus of an opossum.

In the second six inches of the second foot we found the bone of a medium-sized deer, the end of the radius and tibia of a large rodent, and the end of the radius of a carnivore.

The first six inches of the third foot showed the costal bone of a box-tortoise, the metapodial bone of a medium-sized deer, and the pelvis of a peccary.

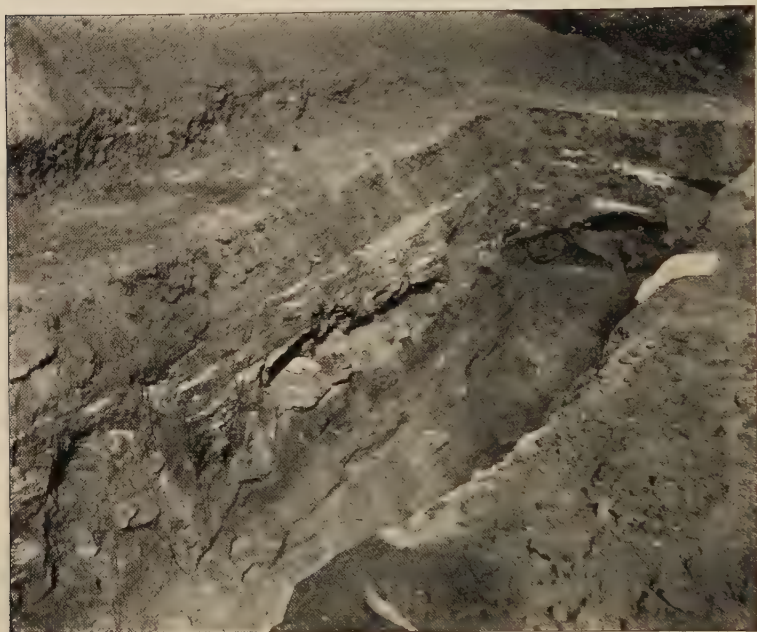
In the first six inches of the fourth foot we found a large artificial disk, rudely cut from the shell possibly of *Busyon*.

A large proportion of the bones found were too fragmentary to be identified. Many, bedded in the ash-bands, must have represented animals cooked and eaten by cave visitors. None of the remains proved antiquity.

The peccary is still common in the region. *Busyon*-shells might have been brought from the sea-coast, about fifty miles away.

a depth of five feet eight inches and seven feet one inch, ran the whole length of the pit. Rising up from it at the west end, and continuing eastward for eleven feet, was a mass of heavy tuberculous stalagmite sloping suddenly downward to the smooth rock

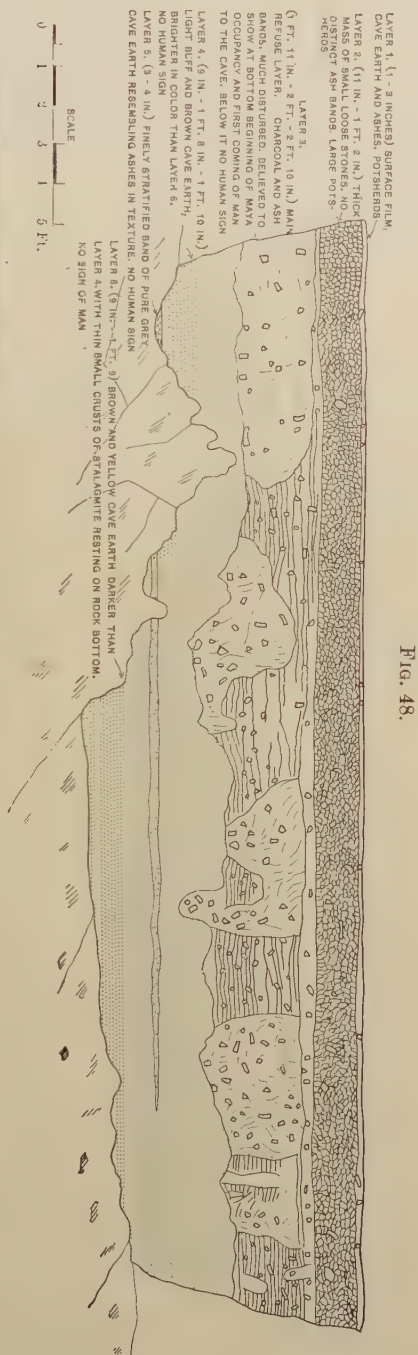
FIG. 47.



Cavern of Loltun. Showing the old refuse layers exposed by our Trench 2 (looking north-east), cut to rock bottom in the floor of the great rotunda.

at seven feet one inch below the surface. (See Fig. 48.) Thence forward to the east end of the trench the rock, now free of stalagmites, rose gently to meet a round loose mass three feet in diameter bedded in the cave earth. Notwithstanding two or three narrow fissures which ran across it, the whole platform at the bottom of the trench might have been said to be solid; but solid or not, there had been a time when it was bare floor, and this time had lasted long enough to let falling drops build stalagmites upon it before the earth layers had been deposited over its surface. The first material to overspread it (see Fig. 48) was

Layer 6, a band of brown and yellow earth one foot nine inches thick in the middle, nine inches thick at the east end, and



Old refuse layers, proving the visits of man to the cavern of Loltun, three miles east of Tabá, Yucatan. Face of Trench 2, looking north. (Cut through the cave floor to apparent bed-rock, at seven feet one inch, in March, 1895. The bones left by the first visitors to the cave are believed to be shown in the lower and unrefilled ash-bands of Layer 3. A portion of the time when the *Mayas* were building the present ruins in eastern Yucatan is believed to be indicated by the upper ash-bands of Layer 3.

Animal remains and shells, with human refuse (from the surface to the bottom of Layer 3): frog, iguana, bird, opossum, rabbit, peccary, deer (two species), man (Layer 3); below *human refuse*: *Melichna fragilis* (Layer 6).

only one inch thick among the stalagmites at the west. At some places it had caked into hard films, as if by the action of drip-water, and once in the middle near the top, and for a distance of about three feet, showed brown and yellow lines of stratification. Its appearance indicated that water had laid it in place, a probability increased by the study of

Layer 5.—This was a waving stratified band of ash-colored earth (see Fig. 48), from three to four inches thick, that extended nearly the whole length of the exposure, dying away at four and a half feet from the east end. At the west end it kept its level among the stalagmites. Stratified, pure, and of like quality throughout, it seemed unreasonable to suppose that wind had found enough dry dust in the damp chamber to do the work, or that a film of the sort should have fallen from the ceiling. At a distance of ten feet from its west end a stalagmitic knob projecting through it showed that the layer had been deposited after the knob had formed, for the latter showed the flinty texture and smooth sides mentioned above that infer formation in the open air. Had drip-water trickling through the earth formed the stalagmite underground, Layer 5 would not have rested clean and pure against its sides, but must have showed a ragged edge, caused by the uneven caking of the carbonates. It did not do so, and the inference was that Layers 6 and 5 had been deposited by a natural agency, probably water, after the cave had begun to form stalagmites.

Layer 4 was a band of light buff and brown cave earth without human sign, and nine inches thick at the ends.

The study of these facts, occupying a long time, had reasonably satisfied us that we had reached the limit of human interference in the cave. The lower three layers (6, 5, and 4) were without trace of man's presence, and to suppose that any such trace lay buried somewhere below us and under the rock-ledge seemed highly improbable. Whether the ledge underfoot was a large fallen mass or the true floor, water had flooded it, water deep enough to deposit the earth layers and destroy life in the cave. Had so large a block fallen from the roof, moreover, the probability was that its downfall preceded the downfall of the surface masses that had once closed the skylight. Before it could have reached its position in such case the cave, if it had any en-

trance at all, must have been dark. We made no further effort to prove that the floor was solid. Without being able to demonstrate that it was, the main point involved seemed established. There was no ground for supposing that there were human remains anywhere in the cave older or deeper than those found. Many bare places on the floor must have been bare long enough to have felt the footsteps of the first comer, whoever he was, and somewhere or other a mixing of old relics with new would have betrayed the past presence of an earlier stage of culture, had it existed; but our trenches dug one after the other to the gunpowder limit, our surface searchings in this as in all other caves had revealed the same facts. Yucatan had seen the builders of the ruins, and them only.

Having learned what we might of Layers 6, 5, and 4, where human tokens were wanting, we next turned to Layers 3, 2, and 1, next above, comprising the zone abundantly affected by man's presence, and where other questions remained to be asked and answered. One of these was the question of age. This zone of human interference, here subdivided into Layers 1, 2, and 3, included the only ancient culture-layer found in Loltun. How old was it? Judged by the age test of animal bones scratched out of its bedded rubbish, no great antiquity could be inferred for its hearths. Again, the fire-builders appeared to have been for the most part maize-eating vegetarians, and in Layer 3 seemed to have cooked and eaten the deer (humerus and several fragments), several lizards (*Iguanidæ*, skull, humerus, pelvis, metapodial bones, and several fragments of tibia), the rabbit, and a carnivore (humerus). But these exceedingly rare bones of still existing species failed to set the mark of geological remoteness upon the deposit. If the fossils of an earlier time existed in the cave, we did not find them in or below the hearths, where their presence would have been of the highest significance, and the results of our work at Loltun, when compared with those accomplished elsewhere, impressed upon us an important fact,—we had dug into no fossil bed anywhere.

Not to speak of the monsters of Tertiary age whose remains, strange to say, no explorer has yet professed to discover in a cave, where were the skeletons of the sloths, the elephants, the horses, the bears, that are known to have roamed both continents in

Pleistocene times? With a clearness that could not be mistaken the cavern at Port Kennedy, in Pennsylvania, had marked the epoch of these creatures. The rock shelters of France are bedded thick with remains of their contemporaries in Europe. Where were their bones in the caves of Yucatan? Did the absence of such fossils underground show that the now waterless region was unfit for the existence of larger mammals in past time, or that the cave entrances were inaccessible or closed to them when they were there? Had they been present in the Peninsula, together with carnivorous animals, the latter might have been expected to have carried portions of their carcasses into subterranean shelters, but with one possible exception we found no cave that in Europe or the United States could have been called an animal den. The traces of the repasts of carnivores were always slight and always modern. Each of these considerations may help to explain the absence at the spots studied of conspicuous deposits of bones, transported by non-human agencies, but it should be borne in mind in the examination of spacious caverns that the particular spot haunted by animals need not coincide with that visited by men.

We saw many places in the caves where animal remains would have been more likely to accumulate than at the level open points chosen by us for digging. Then a new kind of excavation would have been needed to disclose what lay underground in dark and secluded corners, under the shelter of downfallen rocks, where beasts of prey would have dragged their quarry, or in deep-buried cavities at the lowest level, where freshets might have deposited the bones in stratified layers, as at Port Kennedy.

A surprise was in store for us on our final examination of Layer 3, when we found the metapodial bone of a man mixed with the ashes and potsherds. The solitary bone separated from its fellows, surrounded by signs of cookery, seemed to indicate that the fire-builders had once at least feasted on human flesh. It was difficult to reach any other conclusion. Putrefying corpses, lying on the surface, would have tainted the air of the cave. Human burial would have been objectionable so near the source of water-supply, and as there was no sign of rodent gnawing on the bone, and no reason to suppose that a carnivorous animal had brought it to the middle of a hearth site, the inference was that the hearth-builders had either roasted, cooked, and eaten human

flesh, or had inconsiderately destroyed with fire the corpse of a fellow-man left by accident or design in the cave.

One important question remained, What were we to infer from the subdivisions of the hearth rubbish? When closely examined did the whole deposit show characters rude below and improved above, marking the progress of a people who had remained a long time in the region, developing by degrees from a lower to a higher state of culture, or, finding no true difference as we examined the deposit from bottom to top, were we to infer that the first comers had arrived in Yucatan after developing their arts elsewhere? To answer, if possible, these questions we began cutting down, as at Oxkintok, a fresh section, two feet eight inches to two feet wide, along the whole north side of the trench. Going down layer by layer with the trowel, we cleared off each subdivision and scraped clean its bottom before examining the one next below. The top section,

Layer 1, little more than a film of ashes and charcoal, sometimes one inch thick, sometimes scarcely visible (see Fig. 48), was first scraped away. At its east end, where the ashes were thickest, I found no potsherds, but at other points pieces of polished red and polished black ware and coarse brown, unpolished fragments. We had picked up a draughtsman's compass on the neighboring surface of Trench 1, and no doubt other objects denoting white contact were to be found in the layer, though we failed to discover them in the area worked over. What we did find should be taken to stand for the modern period in Yucatan, reaching backward from the present, possibly as far as the time of Spanish conquest.

Layer 2 (see Fig. 48) was a very remarkable deposit of small loose stones about eleven inches thick, running from one end of the trench to the other. The charcoal and ashes of the surface layer had discolored it on top, filtering through the stones, and at one place penetrating it almost to the bottom. There were no stratified ash-bands in it, but fairly in the stones we found polished brown and black sherds, coarse, incised pieces, and heavy fragments with ponderous rims. As a large deep refuse layer lay under it, the wonder was how it came there. It was hard to imagine a flood washing down the stones so late in the cave's history, and, had this happened, a pure layer of ashes lying next

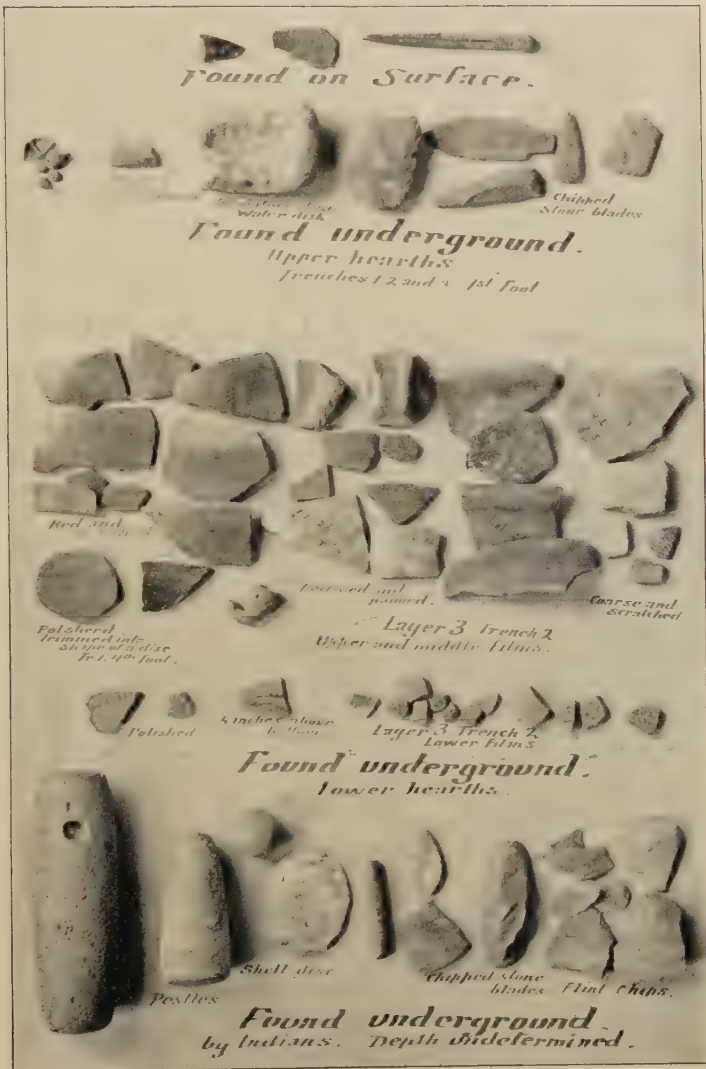
below should have been churned into the crevices of the layer, which was not the case. The stalactites on the ceiling prevented the supposition that the rounded fragments, after falling incessantly from the roof for a certain period, had suddenly stopped, and, unless we inferred that the builders of the hearths below had carried the stones where they were, and spread them out to conceal the then-exposed hearths, their presence remained a mystery. At either end of the trench we found a descending animal burrow, down which stones had faulted into the deposit below, and this brought us to

Layer 3, one foot eleven inches to two feet ten inches thick, and capped with a solid white bed of pure ashes.

We soon found that Layer 3 had been much disturbed, and notably by the burrowing of animals. Working down into it by degrees, and paying particular attention to the parts not faulted by the burrows, we found a point near its west end where the ash-bands ran uninterruptedly from bottom to top. This we chose as the place best adapted for the study of the true character of the whole layer, which was here two feet four inches thick. The ash stripes could be counted one below the other from the top to the bottom, and we worked through these bands inch by inch, to find that the potsherds, which were abundant and large in the upper stripes, became very scarce and small in the lower ones. With very great difficulty I found a minute black polished fragment and three or four unpolished pieces at a distance of about three inches above the bottom; but in the bands below this, after long and tedious search, I could find no pottery at all. The search, repeated at other points along the face of the trench, where belts of ash-bands, undisturbed by burrows, were exposed, had the same results. A few small bone fragments lay beneath the range of potsherds discovered, but that was all.¹

¹ It might be generally said as to the whole culture deposit comprised by Layers 1, 2, and 3, that a large-rimmed, hard-baked grade of pottery characterized the stone bed of Layer 2, and that the finest and best decorated ware was found about the middle and top of Layer 3, while in Layer 1 the quality seemed to have degenerated. We made no further attempt at subdivision. Again we were struck by the rarity of arrow-heads, flint chips, animal bones, and chipped knives. Pottery out of proportion to everything else and far more abundant than in the caves of the United States was, as usual, the chief culture test.

FIG. 49.



FROM LOLTUN.—Earthen-ware and other objects from the human refuse deposit on the cave floor. Specimens studied in comparing the upper and lower portion of the deposit. Earthen-ware becomes rare at the bottom, but is sometimes polished, and marks no earlier stage of human development.

The bottom of Layer 3 marked, as before mentioned, the bottom line of human interference in the cave earth. Taking the whole culture-layer into consideration, its contents, on comparison with objects found at the ruins, indicated the handiwork of one and the same people. Neither here nor anywhere else had we found tokens of a tribe or race of cave-dwellers. As in other

FIG. 50.



Cavern of Loltun (Flower Rock). Showing rays of afternoon sun entering the great rotunda by its skylight, and the earth excavated at the site of our Trench 2.

cases, the fire-builder appeared to have been a visitor. His visits may have lengthened into longer haltings as time went on. He may have waited on occasions for religious purposes, or to cook food, but his main object was to get water and go away. When all was summed up, the study of the trench indicated once more that the first comers to the cave were pioneer bands of Mayas. Discovering the cave in their search for water, they had built fires upon the floor. If as forerunners they were but scantily supplied with pottery, it is easy to understand why the potsherds, rare and absent in the lowest hearths, became abundant above.

When found, the make and texture of the lowest sherds equalled that of the specimens higher up in the layer, and there was nothing in the bones found or in the position or contents of any of the hearths to suggest that the first visitors were a different people from the builders of the ruins.

The results obtained at the two trenches were identical, but there was still a third excavation to be considered. This was the trench before mentioned previously dug along the whole southeast wall of the rotunda, and exposing a belt of hearth rubbish for its full length. We cleaned off its side with trowels and re-excavated a small pit, five feet long and three feet three inches wide, dug against its face for the probable purpose of ascertaining the depth of the cave earth. This brought us to a level rock floor at a depth of seven feet eight inches, when again we saw before us (as described in foot-note)¹ the full depth of the culture

¹ This trench, as remarked before, sixty-six feet long, eighteen and a half feet wide, and two feet deep, was dug, as I afterwards heard, by Mr. Thompson, United States Consul at Merida, in behalf of the Peabody Museum at Cambridge, Massachusetts. What the purpose of its excavation was I have been unable to learn. It did not, however, reach the inner wall of the cave. Many of the objects obtained from it are now on exhibition in the museum, but I have not been permitted to use drawings of any of them. For twenty-two feet we pared off the exposure carefully and studied it minutely, leaving the identification of the animal remains to Professor Cope. (See Fig. 51.) Below three feet six inches, at the deepest, there was no sign of humanity, and the evidence of the other trenches was repeated as we worked slowly through the red and brown cave earth that continued downward thenceforth until rock was reached at seven feet eight inches. The whole deposit was irregular and disturbed, and, while three feet six inches thick in the middle, tapered to two feet six and one foot three inches at the east end. It seemed likely from this thickness in the middle either that a hole two or three feet deep and eleven feet ten inches long had been dug by the ancient cave visitor towards the middle of the exposure, or else that a hollow of that size previously existing had been filled in by the refuse of fires. The layer was too much disturbed to permit a significant classification of the objects found from their depths. There were several animal burrows, in which objects had been conveyed above or below their original point of deposition. One hole was open, but the others were full of dislocated *débris*, which was therefore ruled out of consideration. At one point on the left there had been a considerable down-faulting of the whole mass, and for these reasons the minute distinctions between the upper, middle, and lower zones of ash-films made in the other trenches were not attempted here. But there was nothing in the whole deposit to contradict the other evidence. The layer

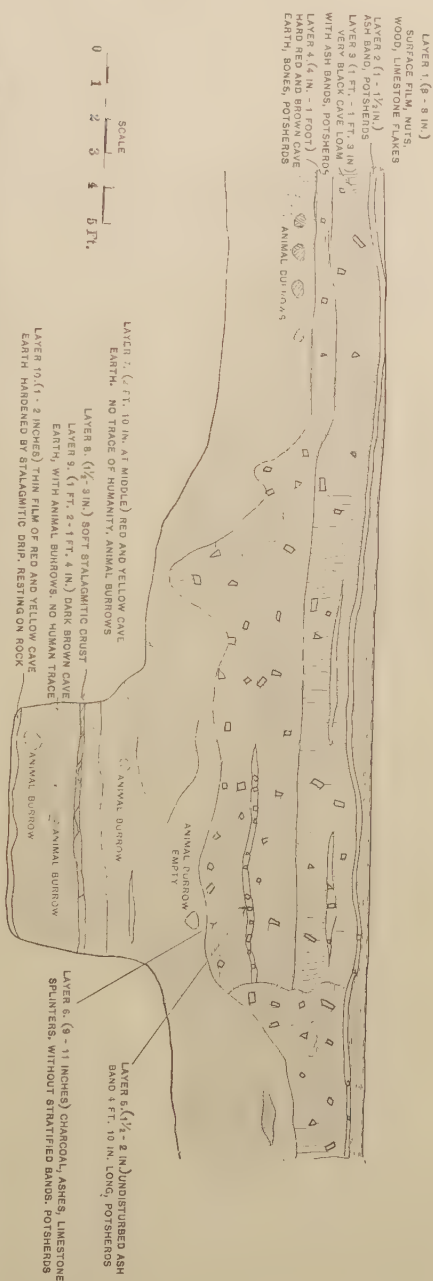


FIG. 51.

Old refuse layers, proving the visits of man to the cavern of Laolun, three miles east of Yabhi, Yunnan. Cleared face of previously cut trench (Trench 3) on floor of great natural, looking south. The time when man first came to the cave is believed to be shown in Layer 6. Minor subdivisions in Layer 6 have probably been disturbed. But the whole deposit (Layers 1 to 6 inclusive) shows the same general stage of human culture throughout. Below Layer 6 all traces of man disappear. The rock reached at seven feet eight inches was either the cave floor or a very large mass which had fallen before Layers 7-10 were deposited.

Animal remains and shells, identified by Professor (Cope and Mr. Pilbry), with *human refuse* (from surface to bottom of Layer 6) : frog, iguana, tortoise, bird, moose, bat, deer (two species), *Platanus heilmanni*. *Buteo human refuse* (from bottom of Layer 6 to rock floor) nothing identified.

layer, and again examined carefully with the trowel the undisturbed cave earth that extended from its lowest limit to the rock

represented one stage of culture and one only. The subdivisions, studied with the trowel by scratching horizontally into the side of the exposure, were as follows (see Fig. 51):

Layer 1 (three to eight inches), a mouse-colored film of surface earth, thicker towards the middle than at the east end, containing nuts, bits of wood, limestone residuum, and decomposed vegetable matter, with polished red, painted brown and coarse, incised potsherds.

FIG. 52.



Cavern of Loltun. Exposure of old refuse layers on south face of trench (Trench 3) previously cut along the south wall of the great rotunda. The bank has been freshly scraped with the trowel. The white bag marks the bottom limit of human disturbance.

Layer 2 (one to one and a half inches) was a band of clear white ashes extending along the whole deposit. It contained plenty of coarse, incised, and red and brown polished sherds.

Layer 3 (one foot to one foot three inches), next below, was a bed of soft, very black cave loam striped near the middle by thin ash-bands. I scratched out of it with the trowel an animal bone, a tooth, and many potsherds. These were unpolished and decorated with incised lines, polished black, polished red and yellow. The black specimens held their polish best. The others seemed to

below. One after another all the conditions of the other trenches were repeated to our satisfaction.

have been dulled as if by the action of acids. At the west end of the exposure the whole band had faulted down into the layer below.

Layer 4 (four inches to one foot) consisted of comparatively hard red and brown cave earth. I scratched out of it the bones of a deer, frog, tortoise, and mouse, the claw of a bird, with the lower end of the tibia of a rodent, and the lower jaw of a long-tailed bat, a piece of chipped flint, and a small, broken earthen vessel shaped like the bowl of a pipe. Potsherds were as plenty as ever; the colors looked dull, but the red polish was distinguishable. Just below this, but only for a horizontal distance of four feet ten inches, lay

Layer 5 (one and a half to two inches), an undisturbed ash-band, with potsherds. Regarding it as a layer in itself, though it only extended a short distance along the exposure, the objects found in it, the fragment of the shell of a box-tortoise, a small tube of stone or earthen-ware, red polished and painted sherds, were separately labelled.

Layer 6 (nine to eleven inches thick) was a bed of charcoal, ashes, and limestone splinters, much disturbed and without stratified bands waving downward irregularly into the large hollow above mentioned in the middle of the exposure. I dug out of it the upper premolar of a deer, a snail-shell, and the bones of a small carnivore and lizard (Iguanidæ), a small perforated object resembling the stem of a pipe, and several fine and well-made potsherds, among them a few positively polished. Like all the others they had a dull look, and may have been corroded with wet ashes. We had now reached the bottom line of human disturbance and worked down into the pure red earth below with the greatest care. Next came

Layer 7 (two feet ten inches thick in the middle), of red and yellow cave earth. The light fell clear upon it. While going over it closely with the trowel I failed to find any sign of human interference. On the east the layer was decidedly red, but the red stripe tapered out towards the middle in a band one foot thick. Across the bottom it turned yellowish-brown. Elsewhere it was yellow. On the west and in the middle I found a hard, blackish streak, which at first looked like a hearth, but the trowel point showed it to be a film of stalagmitic crust. Seven animal burrows ran into Layer 7, one near the middle, two inches in diameter, one to the west, two feet eight inches above its bottom and three inches in diameter. The second was open, but the first was full of black, dislocated cave earth. Four more in a close row and full of black earth penetrated the face of the layer at the extreme east end of the exposure, and another discolored it at the extreme west, on the upper corner. We had learned much from these holes and were now prepared to make every allowance for them. The tunnelling animal, whatever it was, had accomplished much to defeat the purpose of the cave explorer. Old galleries had been filled up with the transported contents of new ones, and may have been reopened to redistribute the mass that blocked them. Some holes seemed to have been enlarged to serve as dumping-places, and when their roofs caved in disturbances on a larger scale had been caused. The clean-cut holes were soon seen, but these faulted areas were more deceptive. Only one test for the depth of an

At last we had evidence clear and full to verify the work done at Oxkintok. What we now knew none of the other caves contradicted, and there was little room left for doubt. A people generally identical with the builders of the ruins had come to the cave. Reaching the region in geologically modern times, and always associated with still existing animals, they had not developed their culture there, but had brought it with them. No human visitor had preceded them.

Our work at Loltun was over. As if at the end of a struggle the cavern had yielded its evidence. When for the first time our anxious feelings turned away from toil, the thought of leaving the place came with regret. For eight days the majestic grandeur of the room in which we stood had worked unconsciously upon our minds. Now it held us hesitating a long time to take a last look. The key to a great secret of Yucatan was there, and we had found it. Elsewhere we had been mocked and baffled

object remained certain, and that was the clearly marked parallelism of the ash-bands. Where this was unbroken we could get the true relation of objects from top to bottom. Below Layer 7 rested

Layer 8 (one and a half to three inches thick), running entirely across the face of the small deeper trench, and suggesting the action of water. Black on the west and brown and white on the east, it was harder than the surrounding earth, and seemed to have been soaked solid by stalagmitic drip. It showed no human trace.

Layer 9 (one foot two to one foot four inches) was a bed of pure, dark-brown earth, turning yellow at the west and showing two animal burrows, the lowest only three inches above the rock floor and full of discolored soil. In the undisturbed layer I found several small incisor teeth of a rodent. Below Layer 9 and resting on the solid rock was

Layer 10 (one to two inches thick): a thin film of earth, light yellow and hardened by stalagmitic drip on the west, red and soft in the middle, and soft, red, and yellow on the east, rested on the solid ledge. Again we had reached a platform of rock. Again we had failed to find the slightest trace of humanity in the subdivisions of pure earth that lay below the now familiar culture-layer. The small pit cleaned out by us to study these lower bands had tapered down to one foot three inches square at bottom. The area of level rock exposed underfoot was small, and, though there was nothing in the red earths resting upon it, save the waving film of Layer 8, to prove positively the action of water, the lower bands were generally identical in texture with those covering the rock in the other trenches. All things considered, it seemed reasonable to suppose that here, at a distance of about two hundred feet from the other excavations, we had encountered the same underlying ledge which we had met before. The results of examination at all three points were corroborative. A small rodent must have been in the cave before the flooding of its floor.

in the subterranean twilight, but at Loltun the forces that wrought the cave and buried its evidence had treated us kindly. The shapes of stone seemed to have turned into masks wearing gentle smiles. Birds flew around the dome, twittering a conversation long familiar to our ears. Fragrant draughts of air came down the skylight. Never had the leaves moved with

FIG. 53.



Entrance to the Cavern of Loltun. Believed to contain traces of the first men who came to northern Yucatan and of those who have since inhabited the Peninsula. The ladder made by modern Indians, who daily visit the cave to get water, is formed of saplings cut with steel hemp-knives, and tied together with twigs. The steps above are cut in the solid rock. Roots of the alamo-tree are seen on the left.

rustlings so alluring. But a well-remembered slanting ray, creeping high on the rock wall, announced evening, and hoping to reach home before dark we turned away for the last time.

CHAPTER XIII.

CAVES NEAR OXKUTZCAB.

THERE was nothing more to keep us at Tabi and much to hurry us away. Those of the party who had succumbed to the sun at Kabah could not yet bear the mid-day heat. To escape it our new plan had been to reach the underground shade about day-break and leave it at dusk, but we could not hope to accomplish this always. The rainy season was coming on, and we feared a break-down at any moment. If we were to get over the ground ahead there was little time to lose.

One of the stones in a gate-post at the *hacienda* had been taken from the neighboring ruins at Labna. As it was covered with heiroglyphs, Señor Duarte had kindly caused it to be removed from the wall to be copied, and while Mr. Corwith was occupied at the cisterns of Chumul near by (described in Chapter VIII.), our last work at Tabi was to take an impression in wet manilla paper of the stone. Then, warned by our experience at Kabah and jealous of every moment, we decided to leave Labna unvisited. The bags stuffed with earthen-ware from Loltun, and the broken vases from Chumul wrapped in sheets of tissue-paper, were hastily packed in boxes bedded with newspapers and dry cane-leaves, and when, as usual, everything was strapped, and piled into two carts and a *volan*, we said good-by to our kind host, Señor Duarte, and turned eastward over one of the rockiest roads that we had yet seen, to the small village of Oxkutzcab.

It was twilight when we drew up at a lamp-lit *tienda* looking out upon a common, where a large *siebo*-tree stood near some ruined arches. A line of low buildings seemed to fade away into the open fields, and we saw the shadow of a church in the distance. The place was deserted. We heard no splash of water, and missed the accustomed groups of white figures with earthen jars. The owner of the *tienda*, to whom we handed our letter of introduction from Señor Duarte, came out upon the square and

consulted a group of men in straw hats and sandals, but when asked about lodgings for our party, they shook their heads. At last one of them led us along a pavement lit by a hanging lantern, stopping often to state our needs to groups of townspeople, but it was in vain. Turning back then, we hunted on, to halt at last before a high, weather-beaten door, where, after pounding for some time, the owner, roused from his sleep, looked out of a grated window, and, when the question was repeated, opened the door. Entering, we made the most of his offer of two small,

FIG. 54.



Our quarters at Oxkutzcab.

bare rooms, hot, full of dust, and opening on the street, and by the time we had prevailed upon an old woman and her daughter next door to cook us supper the baggage-carts had come in. Then we threw the flax mattresses on the floor and tied the hammocks to the wooden wall-pegs with which every room in Yucatan is provided.

A stony enclosure, shaded with palms and surrounded by a loose wall, ran backward from the house, where a pig, tied to a tree, wallowed in the dust. An open stone veranda, overrun

with dogs and chickens, would do, as Robert Anderson explained, for a dining-room; and Frank Hauser, who had learned how to cook over the camp-fire on an earlier expedition in Virginia, built, with the help of our Indian boy, Pastor Leal, a stone oven of approved Kanawha pattern close to the rear wall of the house and under the trees. There was a deep well conveniently near, whose milky water, drawn up in a leather bucket, we took care to boil before using. These were our quarters at Oxxutzcab, close and uncomfortable as might be when compared with our lodgings at the *haciendas*, but immeasurably preferable to a camp in tents in the open forest.

The engineer at Yokat had described the neighboring region as full of caves, and the accounts of our landlord and his friends soon satisfied us that we had not gone wrong. Some of the underground galleries were close to the town, and Mani, with its celebrated cave-well, was only two leagues away; but it took many long and toilsome walks to show us that few were so wet or dry, so large or light, as to warrant our waiting to explore them. We knew too much, however, to be seriously disappointed.

An old chapel known as l'Ermita looked eastward from the hill behind the village. Near it, by the steep roadside, a small rift entered a fissure known as ACTUN SITZ.¹ Accompanied by two citizens of Oxxutzcab and a band of boys, we clambered down the hole on Sunday afternoon, March 10, 1895. The entrance, fifteen feet long by six feet wide, opened into a large, rock-floored chamber, from which a passage led steeply downward. The deeper we went the hotter grew the air. Even the natives yielded to an unaccustomed outburst of perspiration as we slid over the steep rocks, stopping often and stooping to hold the candles low and look at small hollows where charcoal and potsherds had lodged; but the whole topography of the place excluded the notion of primitive habitation, and seventy feet brought us to a pool of lukewarm water, the only object of search that it seemed would have induced a native people to enter the dark, wet, hot cave. Indians doubtless still used the natural well, as their ancestors must have done before them. Probably it

¹ Sitz is the name of a plant with a white flower, as the Bishop of Yucatan informed me, used by the Indians for perfuming a maize drink called *Posole*.

had been discovered and utilized as early as the drip-pools in any of the caverns we had seen, but there was no proving the fact. There was no part of the cave light enough or dry enough to have encouraged the haltings of men who came to get water

FIG. 55.



Actun Sitz.

and went away, and, had we wanted to dig, there were no earth floors. No less unavailable for our purpose was

ACTUN TZU-ZUI (Cave of Pigeons), found after a break-neck clamber around the chapel of l'Ermita, and down a hill-side so steep that the fissure entering its side had the familiar appearance of the usual cave-entrances in other countries. The whole floor was covered with masses of rock, and sloped downward into the dark, where we heard the sound of dropping water, and saw several of the well-known hunters' blinds, built of loose stones. In the crevices between the rocks, where dust had collected, I saw fragments of pottery, and a broken stone water-dish lay in the thicket, about two hundred feet outside the entrance, but there was no level reach of earth floor that could have contained culture-layers. No digging could have instructed us anywhere. We crawled down into the lower part of the fissure, where an inreaching passage seemed to have been choked by *débris*, and then, failing to find any more water-dishes, left the cave.

To return to Oxkutzcab, we climbed down the hill-side without trying to find the path, and, leaving the thicket, crossed a shaky wall of loose stones, like a New England farm fence. Then turning the wrong way across a patch of high grass and thorns, we reached at last a stony lane, and followed it till the way grew dark in the shadow of high trees. The air was full of the smell of fragrant smoke as we approached the village. Many of the palm-thatched cabins were dark, and we saw only the square black door-hole, the outline of a hammock, and daylight beyond. At some, fires shone through open walls of wicker, and where one of these lights gleamed we saw for a moment a level of earth floor, the black outline of a kettle, and a child's figure against the glow. A solitary mule looked over one of the rude stone fences, and we passed a group of women at a gate, talking in a low tone. Now and then I heard the sound of whistled tunes, but there was no singing, no echo of musical instruments. Supper-time came quietly, without busy din or noise of voices among these attractive people, who went to bed early and rose before the first crack of dawn. Their time to make night merry came at bull-fights, or when, in a manner strangely resembling the custom of the wake in Ireland, they drowned grief at the death-vigils called "*baloria*."

To get to ACTUN COYOK, on Monday, March 11, 1895, we climbed the hill west of Oxkutzcab by mule-path, and, crossing a burnt clearing about two miles from the town, reached a sunken area, the fallen roof of a low cave, one hundred and five feet in diameter. Across this broad and gentle incline the entrance, fifty-eight feet wide and ten feet high, was easily seen at a distance. No trees obstructed it. The gray limestone dazzled in the sun, and heavy stalagmites rose against the shadow, like the white columns of a temple. There was a reach of red earth in the low chamber inside, and, though one of our Indians assured us that the cave was waterless, we saw seven stone dishes. Plenty of potsherds lay about the floor and rooted in it, and, filling a small skylight with its trunk, an *akum*-tree grew through the roof into the outer air. Behind it, and near some animal blinds, a level passage led backward between stalagmitic columns. We cut two trenches in the earth floor, but ledges of rock soon stopped us in both.

Trench 1, running inward and begun at forty-one feet inside the arch (five feet wide and seventeen and a half feet long), showed a disturbed mass of potsherds, stones, charcoal, and ashes resting on the hard limestone. The deposit exposed was hardly more

FIG. 56.



Actun Coyok (Coyok's Cave), three miles west of Oxkutzcab, Yucatan. Showing Trench 1, dug to rock bottom on the cave floor, and exposing the refuse layer of Maya occupation. A stone water-dish lies on the floor to the left. An akum-tree rooted in the cave earth in the background has reached the outer air by growing through a small skylight in the roof.

than a film of rubbish three inches, six inches, one foot, and one foot seven inches thick at different parts of the trench. Where it was deepest the rock floor under it was seamed by a narrowing fissure about nine inches wide, which we did not attempt to clean out. Just above the fissure lay pieces of human tibia, fibula, ulna, clavicle, metapodials, and vertebra, with two fragments of femur, split as if for marrow, and nearer the surface, in the upper six inches, a shell of *Cyclotus dysoni*.

Trench 2, seventeen feet to the left of Trench 1, as you enter, seven feet long and four feet six inches wide, revealed the same

band of rubbish, and again brought us suddenly to the hard ringing rock at one foot.¹

The stalactites looked as though they had long ceased forming, but to account for the water-dishes the cave must have dripped

FIG. 57.



Old refuse layer, proving the visits of man to Actun Coyok (Coyok's Cave), three miles west of Oxkutzcab, Yucatan. Explored March, 1895.

Face of Trench 1. A ledge of rock was reached at one foot, one foot seven inches, six inches, three inches, and one foot. No subdivisions could be made out in the deposit. No intermingling of human relics near the bottom altered the appearance of the deposit from that of the other caves examined, or suggested the presence of an earlier race. Human bones found in lower six inches of first foot. Shell of *Cyclotus dysoni* (upper six inches of first foot).

not many centuries ago. Dry as it now was, the burning off of the woods above promised to make it dryer. Even without water it was a delightful resting-place. The air blew cool from the

¹ *Trench 1, first foot, first six inches*, showed on the surface loose cave earth, fragments of nuts and wood, and a helix-shell, with the dung of animals and potsherds. These were black and red polished, ornamented with incisions, coarse, with heavy rims, and white, with black-painted stripes. In the *first foot, second six inches*, the brown cave earth was very dry and mealy, and made a dust in digging. Continued effort with the pickaxe was needed to work out fragments of limestone bedded in it. The potsherds continued. Large fragments of rude, incised ware grew commoner. In this trench, as in most others, save in the special examinations of layers at Oxkintok and Loltun and afterwards at Sabaka, we did not save *all* the potsherds found, but, as a rule, about two-thirds of them,—enough, it seemed, to give a fair idea of the relative proportions of the varying wares.

Second foot, first six inches. The bare rock had closed around us, leaving only a small pocket of rubbish to work in. After finding the human bones above mentioned in this and in the six inches just above it, we followed it downward, stopping at last when the crevice had narrowed to about nine inches in width.

Trench 2 showed in the *first foot* a loose, brown cave earth, marked on the surface with small animal tracks and strewn, as at Trench 1, with bits of wood, dung, little stones, and nutshells. Potsherds, polished and unpolished, were not very plenty in the shallow deposit. We found an unpitted hammer-stone, probably a hard limestone nodule, showing signs of use. No ash-bands were observed.

inner shadow, and the profiles of the stalactites were as beautiful as ever. Small green stalks, marking the innermost growth limit of transported seeds, caught the light on the floor as they bent their pale heads toward the day. Swallows flew among the

FIG. 58.



From Actun Coyok. Potsherds and human bones, some of the latter cracked as if to get the marrow, found scattered together in the ashes and charcoal of the cave hearth (in the first foot of Trench 1), suggesting a cannibal feast at the spot.

Potsherds of types familiar at other caves, coarse, with scratched decorations, and dull white, painted with dark stripes.

roots and vines that hung from the arch, and young banana-leaves moved like fans in the gentle air. It was disappointing to miss the clear evidence of stratified ash-bands in caves like these, but they had their significance. Because no discrimination could be made between any of the objects found, because everything was

mixed and disturbed in the thin films that lay upon the rock, it could not be inferred that the whole range of ancient occupancy was not there represented. The mixture would have shown signs of a foreign leaven if the handiwork of an earlier and quite different people—a race of hunters, let us suppose—had been one of its ingredients, but no such ingredient was anywhere found. Potsherds were the exponents of the deposits from top to bottom.

Visits to four neighboring caves, *Chanz Coyok* (Little Coyok), *Pantak Intul*, *Chum Yah* (Zapote Trunk), and *Mulco*, showed us small, gloomy hollows, less adapted to investigation than the places we had just visited.¹

¹ ACTUN CHANZ COYOK (Little Coyok's Cave) was a shallow shelter, about one hundred yards from Coyok, revealed by the falling in of a circular area of

FIG. 59.



Actun Chanz Coyok, in the hills one and a half miles west of Oxkutzcab, Yucatan. Ideal longitudinal section. Pottery rare. No stone water-dishes. Several hunters' blinds. No water. Bottom at one and a half feet. March, 1895. Scale one inch to twenty-five feet.

roof about one hundred feet in longest diameter. In this sunken amphitheatre, overgrown with long grass, flourished several trees and tall bushes. The so-called cave extended but a few feet beyond the overhang of the crust, and was not high enough to let us stand upright under its ceiling. A water-tank, nine feet three inches long, six feet wide outside, made of stone and mortar, and plastered inside and out, rested on the floor. This, one of the Indians said, had been recently built and used for storing water. As there was no drip falling into it, and as it and the entire roof were dry, we inferred that the cave must still furnish a good water-supply in the rainy season. If this change from a dry into a wet cave happened yearly at Chanz Coyok, the presence of old water-dishes in many of the dry caves was explained. Here, however, though a few pieces of pottery lay about the floor, there were no water-dishes. Mr. Darlington dug a small trench and reached rock bottom at a depth of one and a half feet. No pottery was found below the depth of one foot, and

But the small, dark den called **ACTUN TIPLAMAS** (Cave of Crickets) added not a little to the evidence. Following a wood-path for half a mile from Muleo, and crossing a burnt field, we reached a rift, entered by a gentle grade. Two stone water-dishes lay near the roots of a large tree, close to the entrance. Beyond these a nest of wasps, hanging under the arch, resented our approach, and I found it easier to clamber through a small side fissure and into a chamber about one hundred feet long, fifty-eight feet wide, and five to eight feet high. The place had a strong smell of decaying vegetation, and the Indians, who had declared it to be a den of tigers, entered cautiously. Inside, to the left, where a wide passage led down into the darkness,

the inference was that the cave had not been used as a source of water-supply by the old inhabitants.

ACTUN PANTAK INTUL.—Mr. Darlington and the Indians reached Actun Pantak Intul on March 11, 1895, after half an hour's walk along the mule-road from Actun Coyok. A path led down the side of a large skylight choked with trees and fallen masses of rock, descending which they crawled through a small round opening in the lower corner of the sink, not more than two feet in diameter. Following this passage for fifteen feet, and reaching a perpendicular well five or six feet in diameter, they clambered down the sides of the hole for about twenty feet, with lighted candles, carefully stepping into natural crevices, until an enlarged chamber at the bottom was reached. From this a low passage led them to a second small chamber, and there, against the wall, they found a seemingly artificial mound of stones and earth, about four feet in longest diameter, two feet high, and two feet wide. As they suspected that the mass marked the site of a grave, they dug through it, reaching solid rock under and behind it, to find nothing save a few potsherds mixed with the earth. A few other fragments of earthen-ware were picked up on the floor, but they found no water. Below the first opening another fissure led down into a third chamber, but all of the chambers were pitch-dark, and none high enough to stand in, while some of the passages were so low as to make crawling on the stomach often necessary. These facts and the hard rock generally exposed on the floors unfitted the place for the investigation of layers.

ACTUN CHUM YAH (Zapote Trunk), reached by Mr. Darlington from Pantak Intul, was, like the latter, entered through a sunken area, about two hundred feet in diameter and from ten to fifteen feet deep. Passing into a large, well-lit shelter, the party crawled through narrow galleries and clambered down well-like descents, to enter a series of chambers, none high enough to stand in. In some of the remotest rooms they found pottery, and in one case a stone water-dish, in the darkness. The earth floors of some of these small compartments, not over a foot thick, were proved upon excavation to contain pottery, but, as the passages trenched were pitch-dark and scarcely five feet high, the cave floors did not seem adapted for the existence of significant layers. Cold

several boys who had followed us went ahead with candles, shouting and throwing stones. In a few seconds one of them returned, bringing some of the bones of a deer, and repeating the word *tigres*. While their noise continued we stood awhile looking at the black vault, half expecting to see the malevolent gleam of approaching eyes. Then, as the walls and floor grew lighter to our eyes, we looked about us.

water still dripped from many of the stalactites, which were as white and sparkling as those in the interior of Actun Spukil.

ACTUN MULCO.—Few more delightful resting-places in the forest could be imagined than the cosy shelter of Actun Mulco, reached, after following a

FIG. 60.



Actun Mulco.

mule-path, four miles from Oxkutzcab. Again we looked down a symmetrical sink about fifteen feet deep, encircled with a projecting rock cornice. *Alamo*- and *ramon*-trees, lifting their leafage from the hole, kept out the sun, but let in the air. When I had swung down on a rope, clutching the stalk of a *peshoy*-tree, I found the floor covered with red mealy earth. Close by the walls, as I walked around, I counted no less than six of the familiar hunters' blinds, but no passages led into inner underground chambers. I saw neither stalactites nor sign of drip, and could discover no stone water-dish. A few scattered potsherds upon the surface showed that the place might have been occasionally visited by man, but the signs did not warrant exploration, or promise an extended age-test for the early settlement of Yucatan.

A few potsherds lay underfoot, but the stalactites were dry, and I saw no water. Most of the floor opposed our search with solid ledges and heaps of fallen stones, save where a small earthy area at the left end seemed to warrant digging, and there (seven feet out from the inner wall) we cut our trench, nine and a half feet long, five feet four inches wide at one end and tapering to three feet four inches at the other. Working through a deposit of alternate bands of dark earth and stones mixed with potsherds of the usual kinds and a few animal bones, we reached, at a depth of five feet nine inches, a shelf of rock. This was crossed by a fissure one foot wide, whose bottom we did not reach. Nothing was found to surprise us in the excavation of the trench. The pottery was of the usual types. Some of the bones, like one of a medium-sized deer, at a depth of one foot, may have been the leavings of feasts of the fire-builders. Others may have been carried in by animals whose footprints marked the patches of soft earth. None of the tracks, however, seemed large enough to warrant the assertion of the Indians that the cave was a tiger's den.

The trench when cleared out revealed the following series of subdivisions (see Fig. 61).

Layer 1 (one foot in the middle, and nine inches on the left) showed no ash-bands. Though I found potsherds upon its surface I found none bedded in it. It seemed full of the shells of small snails and decomposed vegetable matter, and was marked by no distinct line of a surface character capping its top. It evidently represented a process of earth-formation in the cave that was still going on, and, if I am not mistaken, indicated about the period that had elapsed since the place was continually visited by man.

Layer 2 (six inches on the right, ten inches in the middle) was a belt of decomposed limestone splinters and black earth, in which I found potsherds, coarse and fine, polished and unpolished, decorated with incisions and plain, and with them a large split bone, part of the skeleton of the deer above referred to.

Layer 3 (one foot four inches in the middle, one foot six inches on the left) was a bed of soft black cave earth, without stones, but striped by an ash-band along the middle for about two feet. I picked out potsherds as usual with the trowel.

Layer 4 (one foot ten inches on the right, two feet six inches

in the middle, and one foot on the left), resting on the rock, was a mass of limestone fragments and black earth banded in the middle, near the bottom, for about three feet of its length, with a film of breccia not very hard, and about six inches thick. Im-

FIG. 61.



Old refuse layers, proving the visits of man to Actun Tiipiamas (Cave of Crickets), in the hills four miles northwest of Oxkutzcab, Yucatan.

Face of Trench 1, looking northeast, cut through the cave floor to apparent rock bottom in March, 1895. Layer 1, of undisturbed cave earth without relics, indicates the lapse of time since man stopped visiting the cave. The subdivisions show disturbance. Human remains continue to the bottom. The deposit is homogeneous from the bottom up. No mixture of relics indicating the presence of diverse races is seen. Bone of large deer found in first foot.

mediately in this crust, and at a depth of four feet eight inches, I found two potsherds, one of them polished, and, though these earthen-ware fragments were more numerous towards the top of Layer 4, I found one, with bits of charcoal, resting on the rock bottom, just under the breccia. The depth, however, I did not take for proof that the piece had been dropped there when the rock was bare, since, as the breccia seemed to have been faulted immediately above it, it may have slipped down in later time.

Layer 4 had brought us to the rock, and night was upon us by the time this evidence had been collected. We had learned nothing new. In spite of the small differences noted between the products of the subdivisions examined, they showed no important variance of race or culture in the periods they reflected. Once again it remained to be asked whether we had reached the true

bottom of the cave. The fissure encountered seemed to indicate that we had not, and this doubt might have damaged the evidence had not the results of the trench been accounted for by so much other testimony. Without the use of gunpowder there was no proof of the existence of another human layer below the limit of our excavation. The caves of Europe had often shown the layer of Pleistocene man at less depths than this, and we left Tiplamas, unwilling under the circumstances to incur the expense and difficulty of further work.

Thus far the caves about Oxkutzcab had all had the same character.

Now we were about to turn to one of the underground pools which, from its position in the once populous plain and known association with the history of the Mayas, seemed to promise unusual results. At the time when the first Spanish conquerors under Montejo had established themselves precariously at Merida, and when the fate of the older people of Yucatan depended on whether the Maya tribes would combine forces or not, Mani was the city where a band of native chiefs decided upon the selfish alliance with the invaders which overthrew their country. When after the conquest and after the evangelization of Yucatan certain of the Indians were suspected of having relapsed into the ancient faith, Mani was one of the places where Bishop Landa made himself notorious by making bonfires of all the ancient manuscripts that he could lay hands on.¹

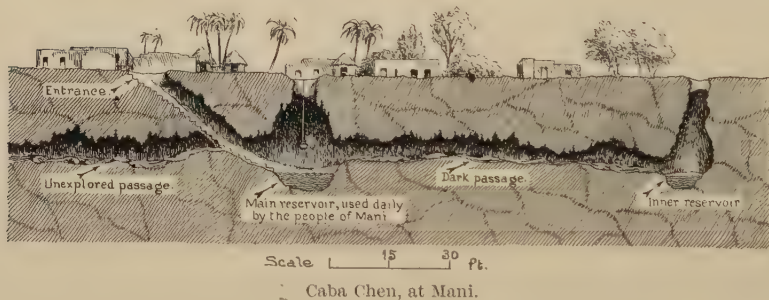
The old city, now a third-rate town, lies near the mountains on the plain, but it is in the line of a journey from the east to Uxmal and Labna, and must have been important from the time of the earliest immigrant because of the abundant water which incoming people would have found in its *cenote* or subterranean basin. This was another of the peculiar caverns, like that at Rancho Chack, which must have been visited in early times more than other caves because they yielded more water, and the only question was whether its passages would prove light,

¹ Five thousand idols, thirteen altar-stones, twenty-two smaller altar-stones, twenty-seven MSS. on deer-skin, one hundred and ninety-seven MSS. of various kinds, were destroyed by Landa, besides numerous similar objects burned at Mani.—Cogolludo, vol. v. 1, Appen. Book 4, page 479, Campeche, 1842.

dry, and broad enough to have permitted the accumulation of culture-layers.

As the country ran level from Oxkutzcab to Mani, we hoped for a smooth road, but the two leagues jolted over were nearly as rough as the dry bed of a torrent. Strange to say, the *volan* went slowly,—so slowly that the Indians sent ahead when sighted kept their distance by quick walking. At last the rocky track caught the shade of palm- and orange-trees, and passed thatched huts and fences of loose stone. Then came some low whitewashed walls and colonnades, and we crossed an open common to draw up at a stone gate, where inside an enclosure of masonry a staircase went down under a dark arch. Women bearing red water-jars stopped to look at us as we climbed out of the *volan*, and, unpacking the camera, descended the staircase. About one hundred steps brought us to a shallow pool of clear, still water, lit from above through an opening artificially made or enlarged, down which hung a leathern water-bucket. When we reached the basin we stepped across the ledge, and then crawling through a narrow hole entered a larger passage. This again narrowing passed for two hundred feet underground and reached at last

FIG. 62.



another shallow pool under a small natural skylight. How far another larger passage to the right of the staircase led underground the Indians did not know, but, impressed with the thought of the geological change which could have once permitted flowing water to form a cave on the present gradeless level, we followed the gallery for some distance, listening to the assertion of the Indians that it was six leagues long, while we remembered the

Maya legend related by Stephens that connected Mami with enchanted passages underground, where an old woman, mother of a dwarf, sits by a stream selling water in exchange for children to be devoured by a serpent.

Right and left potsherds snapped under our feet on the ledges, and in crevices between loose rocks stretches of black earth had been worn smooth by bare feet, but neither at these spots nor along the staircase, where the cleanings of years had been brushed to the right and left behind solid balustrades, were the deposits deep enough for study. Had there been a large, level-floored, skylit room near the water, we should have been obliged to remain at Mami for some days, but no such chance for excavation existed anywhere.

Much of the surface pottery must have been modern. Modern villagers used the well daily, and many of the earthen fragments showed the Oriental form of the latter-day vases. This consideration made us realize that some of the pottery found by us on the surface of other caves was no less modern.

I heard at Calcehtok that the Mayas who fled from the haciendas in 1847 and in the earlier revolutions had often taken refuge in the mountain caverns, though without this information we might have been certain that men escaping to the forest would have gone underground for water. We had seen Indians carrying earthen vases, calabashes, and tin canisters in and out of Loltun, and who shall say when their grandfathers stopped bringing jars of the old shape to this and other caves, or when exactly the art of making the finer polished wares was forgotten? To realize continually that the subterranean chambers had been used to get water and not as habitations explained why all culture-telling traces were rare in them except earthen-ware, and why we did not find in them a more conspicuous range of metal objects marking the time of white contact. Pottery remained the chief test, while what we saw indicated that the mountain Indians went on using caves in the old way, making stone dishes and pottery, as their fathers had done in the sixteenth, seventeenth, and eighteenth centuries.

CHAPTER XIV.

ACTUN SKOKIKAN (THE CAVE OF SERPENTS).

THE hotter it grew the more uncomfortable seemed our small, close rooms at Oxtutzcab, and we hastened our long walks, looking forward to the day of departure. Canvas beds stretched on wooden racks of the Merida pattern were probably unknown in the town, and, as the universal hammock was not to our taste, Mr. Corwith and I had preferred hemp mattresses ingeniously contrived by Robert Anderson, and spread upon the floor, until one night a large black scorpion, which I mistook for a mouse, ran across the pavement near my bed. Escaping our blows, it darted into a hole in the plaster, and when it appeared again later, and again escaped, the whole wall was found to be full of small burrows. For that night at least, sleeping on the floor seemed anything but advisable, and we lost no time in stopping up every den opening with tissue paper.

We rose at sunrise and started early into the woods, while each evening one of the citizens, who had found us our Indian workmen and took much interest in the daily expeditions, came to our quarters, bringing strangers who knew of fresh caves. Then, note-book in hand, we asked the usual questions: How far is it? Must you descend with a rope? Is the entrance large or small? Is it light or dark? Has it an earth floor? Does it contain water?¹

¹ ACTUN KOTMUÑOS (Kotmuños' Cave).—One of these reported caves, seen by Mr. Corwith and Robert Anderson on March 11, lay beyond the hill west of Oxtutzcab, and was entered by a downfallen area about sixty feet in diameter, with an easy descent. The shelter reached about sixty feet under the crust, but digging was impossible on account of loose stones and bare ledges. To the left, on entering, a low passage, four feet high by eight to ten feet wide, continued inward for about one hundred feet. The floor of this dark tunnel showed soft, mealy, cave earth, in which five or six potsherds were found by candle-light.

Near Kotmuños Mr. Corwith saw two other caves with sheltered rotundas

Sometimes we heard of tigers' dens like Tiplamas, but the accounts of Actun Skokikan (Cave of Serpents) outdid our well-remembered stories of snake dens in the Southern Alleghenies. No one had dared to enter Skokikan for several years. Those who had ventured to look down into the chasm described a dark area swaying like the surface of a stirred pudding. This was a mass of intertwined snakes. Others had heard rustling noises but had seen nothing, and sometimes snakes had been lured into the light by the beating of drums. Eye-witnesses described immense folds of serpents large as tree-trunks moving in the shadow. Leaving the snakes out of the question, the description of the cave as a narrow rift descending almost perpendicularly nearly one hundred feet, without water, light, or earth floor, decided against it as a place fit for exploration. Nevertheless it was found well worth examination when Mr. Corwith, accompanied by Frank Hauser and two Indians, visited it after a walk of two leagues in the mid-day sun. They had crossed the mountain and walked for several hours through the close thicket, when to their surprise they came suddenly upon a group of ruins. A crumbling wall was surrounded by an enclosure sixty to seventy feet square, at one end of which stood an oblong mound, and this they entered by a low door, to find a well-preserved stone chamber, about twelve feet long by six feet wide, with an earth floor. The Indians, who had said nothing of the ruins before, called the mound Skokikan, and at length led on to the cave of evil repute, not one hundred feet away. There a rift about twelve feet long by eight feet high opened almost vertically in the level rock, and they went to the edge and listened, but heard nothing. Looking down, they saw a passage descending at a steep angle and faintly lit by the slanting sun's rays. As no snakes were to be seen, they entered and stepped cautiously downward, halting often to shout

about forty feet in diameter, from which trees grew, and where entrance was possible only by means of a rope or one of the long roots.

CAVE NEAR ACTUN SKOKIKAN.—About one hundred yards from Actun Skokikan Mr. Corwith found another cave, reached by cutting a path through the bushes. The cool and beautiful shelter, about fifty feet broad and seven feet high at the entrance, penetrated under the side of the sink for about thirty feet. In it there were several stalactites but no water. Trenches might have been dug in the earth floor, upon which lay potsherds and bones. Many game blinds were noticed, and the Indians said that the place was a tiger's den.

and throw stones, until the candles gave out, when the Indians went into the woods to return with torches of twigs. In the light of these they noticed potsherds on the steep slope as they descended, though a faint ray of sunlight followed them down the rift for a hundred feet at least to its bottom, and there they halted before a small opening between white stalactites. As they were about to crawl in, a strong, sickening smell, which Mr. Corwith compared to that of decayed liquids shaken suddenly in an open bottle, caused them to stop, but when they had passed the opening it ceased. They had reached then a chamber about thirty feet in diameter, and, crossing it carefully, with torches held at arm's length, were nearly sickened by the smell again at the mouth of a low gallery leading into a second chamber. Leaving it behind them, as they crawled on they met it still again in a cramped hole which blocked their way at the end of the last room. If it was the smell of snakes the reptiles must have lurked in branching fissures, but no sign of them was seen or heard, and no poisonous swarm cut off their retreat while their torches waned in the threatening darkness.

Returning to the open air, they wondered again at the lonely ruins. What did they mean? How and when had the name Skokikan (Place of Serpents) been applied to the wild solitude? Was it a modern name or an old inheritance, indicating that the spot had been inhabited by snakes from remote times? His Reverence the Bishop of Yucatan suggested to us later that the neighborhood had been advisedly chosen by the builders of the mound and enclosure, and excavations in the ruins might have confirmed the supposition. Snakes caught alive and drugged with tobacco are known to have been used in the ancient ceremonies of Cuculean, and the mysterious and horrible cave, if inhabited by serpents, would have served the priests well as a capturing place for the reptiles.

After supper at Oskutzcab on March 13, and without any notice of the coming event, we saw a total eclipse of the moon. Shot-guns went off all over the town, fired as we learned by Indians to drive away the terrifying shadow, and when the phenomenon ended the noise stopped.

As far as we could learn from experience and hearsay every Indian in the mountain country had an old-fashioned, muzzle-

loading, single-barrelled shot-gun. These metamorphosed muskets accompanied nearly all our cave expeditions, pointing threateningly into the faces of the party from the guide's shoulders, though the Indians' hope of a chance shot at some bird or animal seemed to have been rarely realized. Beyond flocks of quail and the singing birds which thronged the woods at some places, we saw little game. A very few surface reservoirs of putrefying water remained in the mountains at that time of year (March), and those who had seen them noticed that they were often sprinkled with feathers. On these the larger and more timid animals, like deer, must have depended. Birds and smaller quadrupeds could have found their way into caves, or drunk by night at the water-tanks of the haciendas.

Stephens saw the bed of a dry pool at Telchaquillo, near Mayapan, and visited pools in the rainy season near Uxmal, at Iturbide, at Macoba below Tekax, at Becanchen, and at the rancho of Jalal. The latter, when cleaned out, revealed ancient cisterns built under the level of its bottom, and another with similar cisterns near Iturbide was paved. The old floorings of these mud-holes show that two of them, at least, went dry in the dry season, while the two pools at Chichenitza are surrounded by sheer precipices of rock, and, when all is summed up, it is hard to see how large or clumsy quadrupeds survived the dry season in the northern peninsula before the coming of man. The caves must have been less accessible in geologically ancient times, and it need not be surprising if no large fossil deposits are ever found in them. Many ponderous mammals might well have avoided the waterless country north of Lake Chichankanab, so that we may look there in vain for the remains of the elephants, horses, mastodons, and sloths that roamed the American continent in Pleistocene times.

CHAPTER XV.

THE LAST TRENCH AT SABAKA.

POPULOUS, rich, lively Tekax was a great contrast to Oskutzcab. For the first time in the expedition, after leaving Merida, we stopped at a hotel, where boiled meats and vegetables, highly seasoned with *chile*, a fine kind of macaroni, and piquant soups daily disproved the statements of certain fellow-passengers on the steamer, who told us not to expect a good dinner after leaving the ship. The cocoa of the country was good, and the sodden, doughy *tortillas* only needed blistering on the oven, when they swelled up like Saratoga potatoes. Once more we enjoyed the comfort of beds of stretched canvas, and it was even possible to buy ice, after we had half forgotten the meaning of the luxury.

The streets leading to the large square grew lively in the late afternoon, when carriages rolled over the rough stones, and Meztizas with embroidered dresses and young men in starched shirts and European clothes began to show themselves. Later a band played on the square, or we heard the sound of clarionets at Meztiza balls in the suburbs. At these dances the dark, handsome girl seemed to have lost something of her charm. Starch and frills had marred the grace of her every-day dress, while her blue scarf laid aside revealed coarse black hair tied in a very projecting knot behind the head; and when, by the rules of the dance, she put on a man's hat, she became worse than commonplace. As at Opichen the dances at Tekax were solemn, in spite of the lively music. Solitary figures of both sexes shuffled quietly backward and forward, with arms hanging by their sides, while their faces wore a stolid expression. What the rules were I did not learn; but how the stranger, even granting him a knowledge of the Maya language, could have amused himself with the fair sex it was hard to see. Meanwhile the kind hospitality of the men outshone all comparison. They explained everything, conducted us everywhere, and, in spite of protest,

paid for all refreshment; nevertheless nothing was said of the ladies. The handsome Meztizas remained sitting alone, speaking to each other in subdued tones.

This outer coldness of demeanor between the sexes, noticeable at a ball, seemed fashionable everywhere in Yucatan, where we rarely observed the Maya Indian speaking to a woman on the street, and more rarely still walking with one, and where, to the surprise of the stranger, the fair Meztiza passes to and from the well unnoticed and unnoticing.

Behind Tekax the hills looked at last like mountains. The range had broken into spurs, enclosing small valleys, and it was by the most picturesque path yet trodden that our way led to the celebrated Cavern of Sabaka (Coal-black Water), two leagues west

FIG. 63.



Actun Sabaka (Coal-black Water), longitudinal section.

of the town. The forest had become more open. Here and there larger trees had leaves, and we escaped the sun in patches of shade where the underbrush was thin. Twice we lost the path at false turns, until, coming out of the woods, we looked down over a valley where the sunbeams gleamed on a field of young sugar-cane. The panorama was strangely beautiful. Early in the morning the distant region looked green and cool. From the playing of cloud-shadows we imagined high groves, and brooks and pastures, where there were none, or plantations such as you see over the Vega at Granada, though there was only one white wall in sight. But the trickery of the forest was betrayed when the downward path showed us the true thicket again, parched and shadeless as ever. Following the edge of a cleared field, we

turned towards a hill-side, there to find at last the *alamo*-trees that shaded the opening sink of Sabaka.

The entrance was so gentle that we hardly realized that we were crossing a sunken area sixty-two feet broad on a downfallen roof. The real cavern was unseen until we had passed for one hundred and seventeen feet through two dry, cosey little rooms,

FIG. 64.



Brink of the chasm at the entrance to Sabaka.

lit and warmed by holes in the ceiling. In these antechambers insects hummed, and footsteps on the dust proved the ingress of straggling cows. The innermost arch was about sixty feet in diameter, and there, where the roof was supported by a heavy stalagmite, we looked down into a sombre chasm. Creeping carefully to its edge, I followed an Indian whose head and shoulders disappeared over the brink as he grasped the posts of a long ladder of boughs. The descent by twenty-five rungs introduced us to a well about sixty feet deep, and when we looked up from its bottom we saw the sky above us through a round hole apparently

thirty feet in diameter, while below us the loose rocks sloped down into a large, dim chamber. A festoon of stalactites hung across the ceiling and caught the light, but beyond them and above, our eyes, ungauged to the darkness, failed to measure the size of the vault. There was no sound of birds or trees, but the still air was cool as we entered, and, passing onward, lit our candles to advance into a passage leading beyond. Walking slowly for two hundred feet, we reached a dimly-lit rotunda with a rocky floor. Then came another passage, one hundred feet long at least, which suddenly grew very hot, and brought us at last to pools of tepid water. Potsherds scattered the path in these dark passages, but the outer chamber was best adapted for exploration.

Returning to it, we found a reach of floor, at many places clean and well scattered with fragments of earthen-ware, one hundred and ninety-four feet long and eighty-four feet wide from wall to wall. On it we counted twelve stone water-dishes, some of which, set level, still caught the echoing drops, while a thirteenth, dug out of a log, stood full of water close by. I could find no native paintings or carvings upon the rocks, but, as at Oxkintok, the inward slope at the entrance was protected by loose walls of unmortared stone. Two of these ran across the grade like terraces, as if to catch rocks that fell down the well, and to prevent their down-rolling into the chamber, and close upon the left wall, half-way in, a pile of loose stones, about twenty feet in diameter, rested on the clean earth, against and around which, as if to keep it in place, another rough wall had been constructed. No doubt the walled stone-pile had been placed there purposely, and the evidence indicated that at the time of ancient cave visitation much of the floor had been deliberately kept clear of loose stones. Here, again, entrance to the cave was impossible without artificial help. The pre-Columbian Indian must have used, like his modern successor, some sort of a ladder.

Our work was nearly over, for we had now reached the end of the region proposed originally for exploration.¹ All the

¹ ACTUN CUSH-HU (Cave of the Iguana), visited by Mr. Darlington on March 15, 1895, lay about two and a half miles to the northwest of Sabaka, and was one of the few caves seen with a horizontal entrance. The arch, thirty-five feet long and fifteen feet high, penetrated the side of a small fallen area, which was hardly to be distinguished from the surrounding surface. The

conditions were favorable at the spot, where the whole truth awaited us, but the flavor of unknown possibility that had so often lent excitement to our work had disappeared, and we thought we were justified in guessing that no discovery would be made to upset what had gone before. Where the floor sloped upward on the left side of the cave, and close to the wall, we marked off our first trench, and after it was finished we dug three others, to obtain corresponding results in them all. What we saw added details to the general mass of evidence, but contradicted nothing. Trenches 2, 3, and 4¹ were fairly included in the results obtained at Trench 1, which summed up everything. This was thirteen feet nine inches long and three feet six inches wide, and brought us into a close-laid series of thin ash-bands, which extended downward without interruption. As the Indians worked on, the usual kinds of potsherds were thrown out, together with the femur of an iguana and the hind canon-bone of a medium-sized deer in *the first six inches of the first foot*, and the hypoplastral bone of a land-tortoise and the tibia and clavicle of a man in *the second six inches of the first foot*. We found a bone needle, but no attempt was made to classify the layers till we reached a hard-rock ledge at a depth of two feet three inches on the east end of the trench. If all the earth had been scraped off the high area on which we were working, a solid platform would have been laid bare, extending along the cave-wall for nearly one hundred feet, but we did not do this, and because we found no hollows along the base of the walls to indicate that the platform was a

chamber, about sixty feet long by forty feet broad, was dry. One stone water-dish and half of another lay, with a number of potsherds, upon the floor. The patches of loose earth that covered the rocks underfoot seemed too small to warrant excavation.

ACTUN PET COT (Cave of the Round Fence, probably a shooting-blind).—Mr. Darlington, visiting this cave on March 15, 1895, found a small rotunda twenty feet deep, and entered by means of hanging roots. There was no dripping water, and no water-dishes or pottery were found upon the floor. Three blinds for shooting animals may have suggested the name.

ACTUN HAS (Banana Cave) lay about two miles from Sabaka. To enter it, Mr. Darlington climbed down twelve feet through a skylight twenty feet in diameter. The cave when visited was dry, though one water-dish and numerous potsherds were found on the floor. There were no large patches of earth underfoot, and it seemed inadvisable to dig a trench in the loose stones.

¹ See foot-note to page 155.

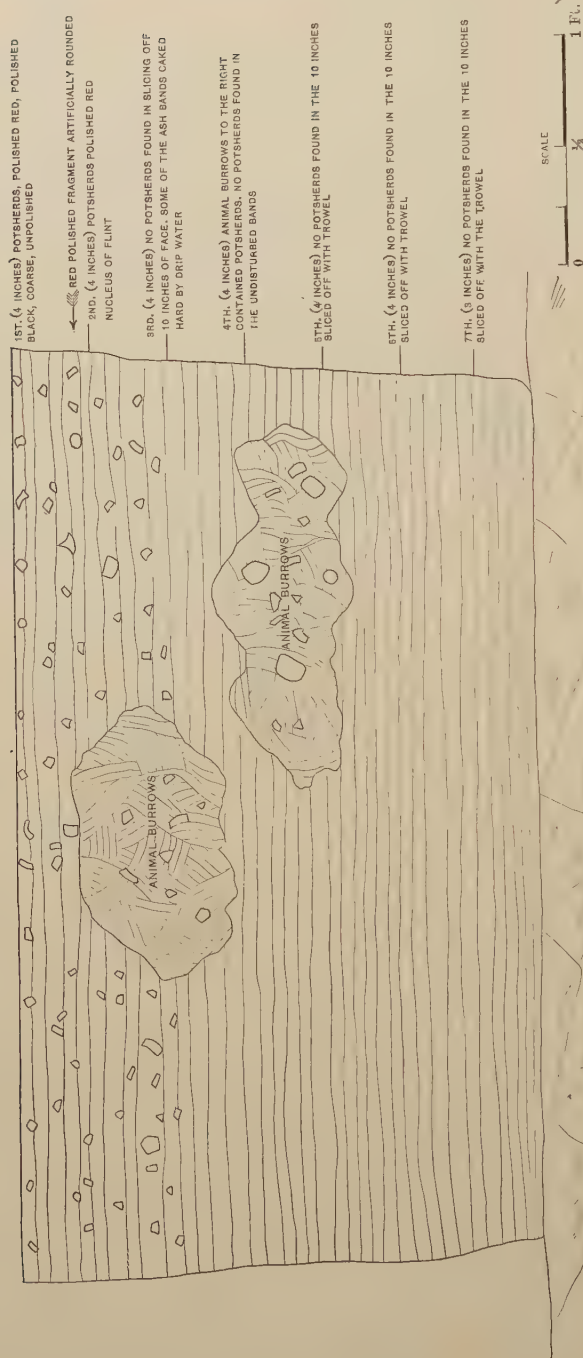
loose mass underfoot, and because a solid ledge less masked with earth presented a similar outline on the opposite side of the cave, we were content with the probability that the rock reached in Trench 1 was the true bottom. Candles were needed to make the careful study of the exposed layers which followed. When the north side of the trench was pared down, there seemed to be no prominent mark of division anywhere. The whole exposure was striped by horizontal films of charcoal and ashes, about an inch thick, resting regularly, one above the other, from bottom to top, like growth-rings in a tree. I counted thirty-seven of them, undisturbed, at the east end of the trench. If this were the whole culture-layer of Yucatan, as we supposed, here was the opportunity to settle the question of its subdivisions, if it had any, though again we had disposed of all notion of an earlier man, or a Paleolithic visitor, antedating the Mayas by thousands of years. These hearth-films evidently represented the rubbish heap of the same people that we had encountered in the other caves, but the deposit was so neatly arranged and so conveniently presented that, if there were any signs of cultural development or race change in it, we might expect to find them without much trouble.

An undisturbed ash-band marks a points in time. Nothing can get below it which does not antedate it. Nothing lies above it which has not come after it. Once again we wished to be sure whether the people before us had developed their arts by slow stages in Yucatan. Had they done so, then the character and make of objects found in the ash-bands ought to have improved from the bottom to the top. On the contrary, if no such development had taken place, if the builders of the fires had come to the region already advanced in the grade of human progress, then the contents of the films ought to have remained identical, as we dug down or up.

As there seemed to be no exposed line of subdivision among them anywhere, we decided to work down through them by cuttings four inches thick, made one by one, over an area two feet wide, along the end of the trench.

The first four inches, carefully examined with the trowel, showed polished red and black potsherds, and coarse and fine unpolished fragments. Towards the bottom a piece of polished ware had been trimmed into the shape of a circle.

FIG. 65.



Old refuse layers, proving the visits of man to the Cave of Sabaka (Coal-black Water), in the hills three miles west of Tekax, Yucatan.

First attempt to trace subdivisions in the deposit at the spot. End face of Trench 1, looking east, reaching rock bottom at two feet three inches, and exposing thirty-seven very thin ash-bands, the lowest resting on the rock. Potsders were numerous in the upper eight inches of the deposit, but below this none were discovered in the thirteen inches of ash-bands worked down inch by inch and for ten inches horizontally inward with the trowel. Animal burrows had disturbed the deposit at two points. Human bone found in the lower six inches of the first foot.

The second four inches had been disturbed by an animal burrow covering an area nearly a foot square, and about half-way from either end of the trench. It contained polished red and black and fine thin potsherds, and a nucleus of chipped hornstone. In the

Third four inches I could find no potsherds over the area worked. Some of the ash-bands were caked hard, showing that carbonated water had dripped at the spot during their formation. In the

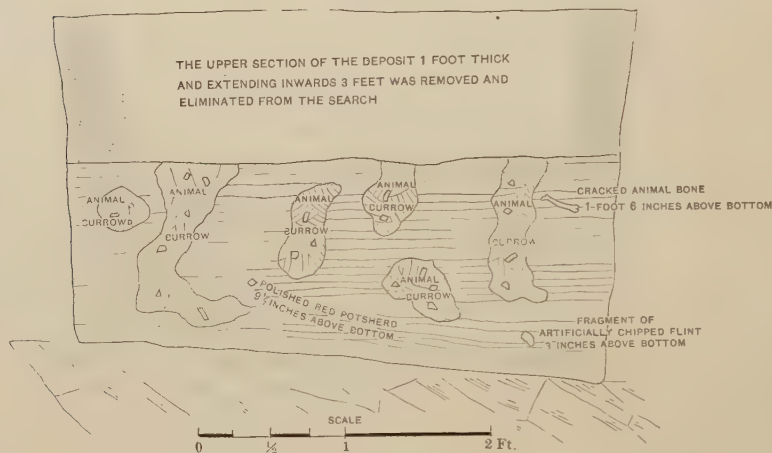
Fourth four inches most of the right end of the belt was interrupted by burrows, and the potsherds therein found, together with a small round ball of a hard white substance about half an inch in diameter, did not belong to the depth examined, nor could I, in spite of the closest search, find a single potsherd or other human relic in the

Fifth, sixth, and seventh four inches. The result of this scrutiny of eight to ten cubic feet of ash-bands, carefully worked over inch by inch with the trowel, showed the notable fact that the potsherds and other human relics in the deposit were all on top and in the upper eight inches; in other words, that the lower two-thirds of the refuse contained no human relics at all. Pottery had grown rare in the lower layers at Loltun, but there had been no such proportion of empty ash-bands as this anywhere.

Surprised at the result, we determined to verify it by a second trial on the following day, when, beginning at the east end of the trench, we simplified our task by shovelling one foot off the top of the deposit over an area four feet long and three feet wide. This started us fresh on the lower fifteen inches of ash-bands, which had thus far proved free from any human relics. It was a long and tedious task to pare these down with the trowel. One-fifth of their cubic contents, at least, had been disturbed by burrowing animals, but when the holes were carefully cleaned out the undisturbed belts of stripes rose plainly between the clearings, and at last, in one of these original belts, in the *fifth four inches*, Mr. Darlington showed me in place a small red potsherd of fine make, at a depth of one foot seven inches below the original surface, and nine and a half inches above the bottom. An hour's work found no other piece, but finally revealed a cracked animal bone in the *fourth four inches*, at a depth of one foot four inches, and then

an artificially chipped flint in the *seventh* four inches, at a depth of two feet four inches and three inches above the bottom. As we advanced into its eastward grade the deposit had grown thicker, and the trench was now eighteen feet long and two feet

Fig. 66.



Old refuse layers, proving the visits of man to the Cave of Sabaka (Coal-black Water), in the hills three miles west of Tekax, Yucatan.

Second attempt to trace subdivisions in the deposit, showing the extreme rarity of human relics in the lower series of ash-bands. End face of Trench 1, looking east, after a section one foot thick (shown in Fig. 67) had been taken away. Rock bottom reached at two feet three and two feet ten inches. The number of ash-bands had slightly increased. The upper foot of the deposit was removed without examination, and a careful search made in the remaining fifteen to twenty-two inches, advancing into the exposure three feet. In the undisturbed ash-bands, which were easy to discriminate from the animal burrows, only three relics of human handiwork were found.

ten inches deep at the east end. But, bent on making sure of this comparative absence of potsherds in the lower ash-bands, we enlarged it still farther. Once again we removed the top foot from another area four feet long, three feet eight inches broad, and turning southward from the east end of the trench, like the arm of the letter L. The most exhaustive examination, however, of the block of ash-bands exposed failed to reveal a single human relic.

This great relative thickness of the non-relic-bearing ash-bands was the striking fact at Sabaka. Yet if the empty films had indicated a period separated by an interval of time from the coming of the makers of the upper hearth, there ought to have

been an intervening sheet of undisturbed cave earth or mould dividing them from the relic-bearing zone above, but no such line of demarcation existed. The bands lay one upon another, without interval. The single potsherd and chip of flint found near the bottom showed that the arts of pottery-making and stone-chipping were known to the first fire-builders, while the absence of all other accompanying traces of culture was no indication of the presence of an earlier or more primitive people. Savage, hunting races, dwelling in shifting huts in the forest, have been found to strew cave floors with a wide range of objects. To them caverns may have been at times refuges and dwellings rather than public wells, but no evidence in Sabaka or anywhere else showed that these caves had ever been visited by such a people. No great age could be inferred from the mere thickness of the non-relic-bearing bands or the stalagmitic caking of a bottom film in Trench 2 (described in the foot-note), for twenty bonfires built in a year at the same spot would have produced a deposit equally thick, and stalagmitic crusts form fast or slow, according to local conditions, as is shown by Professor Adami, of Bayreuth, in the *American Naturalist* for December 1, 1894. All things considered, the empty ash films of Trench 1 in Sabaka seemed to have no more meaning than those found in Loltun, where they had indicated, for the reasons given, the first incoming wave of Maya immigration, and there was nothing in the more disturbed and less significant deposits encountered at Trenches 2, 3, and 4, described below,¹ to contradict the inference that an unestablished

¹ TRENCH 2 (seven feet six inches long and five feet wide), near the middle of the cave floor (see Fig. 67), was cut through a series of bands of cave earth and rubbish, arranged in hearths, to a solid ledge at two feet six inches.

In the original excavation the *second foot* showed the bones of the mouse, the ilium of a bird, the tibia, pelvis, and lower jaw of a peccary, the calcaneum of a rodent or carnivore, and a fragment of the femur of a man, which latter, under the circumstances, once more seemed to refer to a feast upon human flesh.

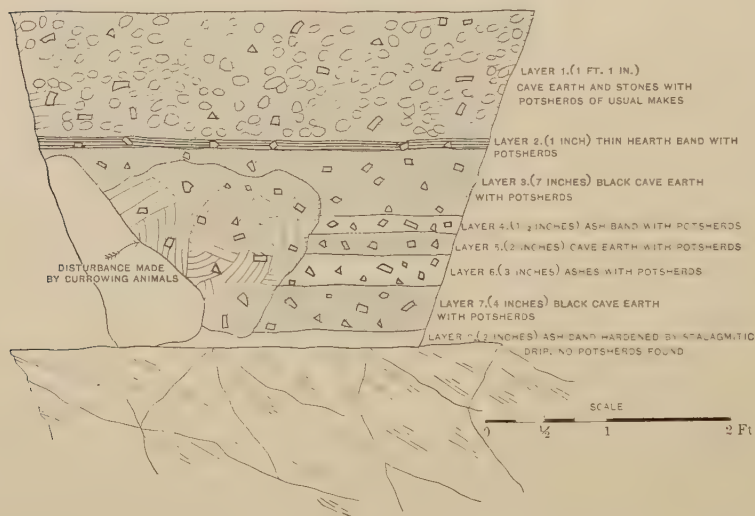
The *third foot* showed the bones of the iguana and a bird, while the Indians pulled out of the trench at undetermined depths the incisor of a gopher, the fragment of the upper jaw of a man, and bones of the opossum, bird, deer, and dog.

The left part of the east face was occupied by a rock one foot four inches in diameter, and the central part disturbed by animal burrows. When the eastern end was scraped clean, eight subdivisions were exposed.

agricultural people, knowing the potter's art, but as yet unprovided with earthen-ware, entering the caves, not to dwell in them,

Layer 1 (one foot one inch), cave earth, with stones and potsherds of the usual makes, together with the astragalus of a peccary.

FIG. 67.



Old refuse layers, proving the visits of man to the Cavern of Sabaka (Coal-black Water), in the hills three miles west of Tekax, Yucatan. Explored March, 1895.

Face of TRENCH 2, looking east. Layer 8 is believed to indicate the time of the first coming of man to the cave. The first comers are believed to have been pioneers unequipped with pottery, who built the first fires (Layer 8) rather to light the cave than for cooking. This would explain the absence of pottery in the ashes of Layer 8. The whole deposit (Layers 1-8 inclusive) is otherwise of one character. No sign of earlier race or previous stage of culture is seen.

Animal remains found *with human refuse*: Colubrine snake, bird, opossum, gopher, mouse, dog, peccary, man, the latter suggesting cannibalism.

Layer 2 (one inch), a thin hearth band with potsherds.

Layer 3 (seven inches), black cave earth with potsherds.

Layer 4 (one and a half inches), ashes with potsherds.

Layer 5 (two inches), cave earth with potsherds.

Layer 6 (three inches), ashes with potsherds.

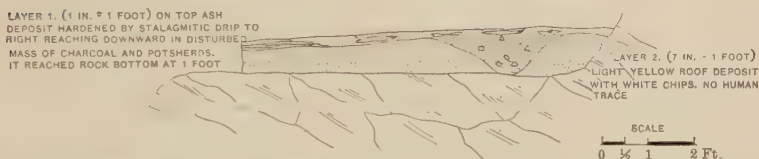
Layer 7 (four inches), black cave earth with potsherds.

Layer 8 (two inches), a band of ashes hardened into stalagmitic crust. This was difficult to cut away with the hammer. In it I could find no potsherds for an area of about two square feet examined, so that here again the builders of the first fires seemed to have been scantily provided with pottery.

TRENCH 3 (six feet nine inches long and three feet two to five inches wide), close against the south wall of the cave (see Fig. 68), was dug through yellow

but to get water, would have built their first fires to make a light rather than to cook food. When we realize further that the fire cave earth and hearth rubbish, and reached the solid surface of a ledge at one foot. A special examination of its exposed east side showed

FIG. 68.



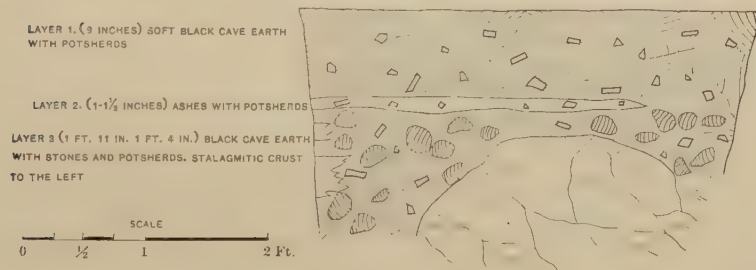
Old refuse layer, proving the visits of man to the Cave of Sabaka, in the hills three miles west of Tekax, Yucatan. Explored March, 1895.

Face of TRENCH 3, looking east. The rock ledge is too narrow to have been often resorted to by the cave visitor. The relic-bearing deposit is comparatively thin. A hole seems to have been dug in the yellow cave earth by the fire-builders.

Layer 1 (one inch to one foot), a thin ash deposit (with potsherds of the usual make, and a bone gorget with two perforations) hardened on the surface by limestone drip but soft inside, sloping to rock bottom on the south in a gutter-shaped cavity about one foot three inches wide; and

Layer 2 (seven inches to one foot), a band of yellow roof deposit and white splinters, without human trace, resting on the solid rock. But the ledge here was too narrow to have been often chosen by the fire-builder. As might have been expected, the deposit was insignificant.

FIG. 69.



Old refuse layers, proving the visits of man to the Cavern of Sabaka, in the hills three miles west of Tekax, Yucatan. Explored March, 1895.

Face of TRENCH 4, looking east. The subdivisions of Trench 1 are lacking. The deposit shows but one clearly-marked ash-band. Potsherds rest on the bottom. The trench represents the lowest and dampest part of the cave floor examined, where the deposit would have been within reach of down-rolling stones and earth from higher levels in the cave.

Animal remains found *with the human refuse*: bird (first foot), man (first foot).

TRENCH 4 (six feet four inches long and three feet nine inches wide) was dug in the soft black cave earth, between the southern ledge examined by Trench

more easily keeps up a source of light than the waning torch, and that the need of permanent light was greater, perhaps, at Sabaka than at any other of the important caves, we probably account for the absence of culture traces in any given ash layer, and so for the peculiar thickness of the non-relic-bearing bands.

To examine again the objects unearthed in the cave was to be struck by the significant presence of fragments of human femur

3 and a sloping bank of loose stones. (See Fig. 69.) The soft earth containing the usual potsherds lay upon a crust of decomposed limestone. Cutting this away we came to solid rock in the middle, at a depth of one foot one inch.

When the east end of Trench 4, which caught the light from the entrance, was pared down, it showed three subdivisions:

Layer 1 (nine inches), cave earth with potsherds and a helix-shell.

Layer 2 (one inch to one and a half inches), ashes with potsherds.

Layer 3 (one foot eleven to one foot four inches), black cave earth and stones, with potsherds. The rock bottom sloped downward on either end of the exposure, suggesting the round end of a projecting mass. We followed the rubbish down these inclines to a depth of one foot four inches on the right, and one foot eleven inches on the left. At the latter corners weak crusts of stalagmite were encountered. The bones of a bird and the femur of a man found in the first foot in the original digging of this trench must have belonged either to Layer 1 or to Layer 2. The latter, as at Loltun, again suggested cannibalism.

Every available area on the cave floor had now been probed by our trenches, which ran almost in a straight line north and south from wall to wall. This trench had reached the lowest part of the floor deposit examined, but the place

FIG. 70.



Actun Sabaka. Cross-section, showing position of our trenches.

was wet and not adapted for fire-building. Down-rolling objects from higher areas would have caught there, and the human rubbish could not have been expected to be thick or undisturbed.

FIG. 71.



From Sabaka. Pottery, etc., and bones from the human refuse deposit on the cave floor. Specimens of pottery studied in comparing the top, middle, and bottom of the deposit. The ware of the lower films, though very rare or absent (in lowest), marks no earlier stage of human development.

The human bones, scattered with potsherds and other traces of cooking in three of the trenches, at depths of one and two feet, again indicate cannibalism.

found in the original excavation of Trenches 4 and 2 at depths of one foot and two feet.

Dislocated from the skeletons, mixed with charcoal and ashes, and associated with the remains of eaten animals and the traces of cookery, they gave us little reason to doubt their true meaning. If the fire-builders had cremated their dying friends in the cave, or if unburied or half-buried corpses abandoned by certain cave visitors had been burned at the cooking-place by later comers, for cleanliness sake, their position might have been accounted for. But when the human bones found under the same suspicious circumstances at Coyok (where one seemed split as if for marrow) and at Loltun were considered, it was easier to infer that we had discovered the remains of a cannibal feast, and that a people familiar with the terrible sacrifices illustrated in the codices Troano and Cortesianus had sometimes cooked and eaten human bodies at Sabaka.

This ended our search in the caves. Once more we had confirmed the results of previous work without making any startling discovery. The thrill of a pursuit beset with alluring chances, the enthusiasm that would press over the boundary of the unknown to see Truth in a new and glittering dress, had forsaken us at the gloomy cavern, and the clay-stained pottery and bones that strewn the ground or filled the muslin bags at our feet seemed at the moment a tame return for our labor. Nevertheless, there was little reason to be disappointed in the evidence which here furnished the last link in an important chain.

CHAPTER XVI.

A SUMMARY.

OUR work in Yucatan, with its hurry, risk, doubt, and chance, was over. When we had risen at five, packed our apparatus on the train, and found places in one of the familiar little cane-seated cars, care and responsibility took leave of us for a time. In the twilight the early sun's rays were brightening the east, as we rolled out of the dusty station, leaving carts, *volans*, and a throng of Indians behind us, while the sight of the dim forest through the open car windows recalled that evening when on the way to Merida we had looked out for the first time over the same wilderness. The intervening two months seemed a long time; nor was it easy to realize that, after all, the area gone over had not exceeded one hundred miles in length by ten in breadth. Twenty-nine caves had been visited in sixty days, of which ten had been excavated. Thirteen had had archaeological significance. Six had yielded valuable and three decisive results.¹

We had seen but little of the ruins. We had not passed southward over the boundary-line into the great wilderness, whence fables of lost cities reach the traveller's ear. Our continued study of an underground layer of human refuse substantially the same in all the caves, instructive as it was, had taught us but little of details. Evidently a wide range of tools and

¹ Spukil, Sayab, Chambak, Jeh, Oxkintok, Chekt-a-leh, Xmak, small nameless cave, Lara, Negro, Rancho Chak, Loltun, Sitz, Tzuzui, Coyok, Chanz Coyok, Pantak Intul, Chumya, Mulco, Tiplamas, Mani, Cush-hu, Petcot, Has, Kobak, Kot Muños, Skokikan, cave near Skokikan, and Sabaka, twenty-nine in all.

Excavated Spukil, Sayab, Oxkintok, Chekt-a-leh, Xmak, Lara, Loltun Coyok, Tiplamas, and Sabaka, ten in all, which with three others not excavated, Chambak, Rancho Chak, and Skokikan, were of archaeological significance.

Of the six very significant caves, Sabaka, Oxkintok, Coyok, Tiplamas, Loltun, and Chekt-a-leh, three, Sabaka, Oxkintok, and Loltun, had yielded decisive results.

implements had not been left, lost, or broken in the subterranean rooms. We did not find and did not expect to find that the water-producing underground chambers had been used as burying-places. Neither were they dwellings, but rather temporary halting-spots, which but for the water-supply would probably have shown fewer human traces than do the caves of the United States. Human bones scattered in the rubbish indicated that the old inhabitants of Yucatan practised cannibalism. Beyond that, the traces of pre-Columbian cookery at the underground sites referred to an ancient cave visitor who was rather an agriculturist than a hunter, and who (unless the dog found at Sabaka be an exception) possessed no domestic animals.

We had learned little of stone-chipping, and had found in the scanty list of stone blades but one imperfect point that might have served for an arrow-head. The secret of stone-carving we had failed to discover, and, though the whole mystery had seemed within our grasp at Oxkintok, we had to rest content with proving that the chiselling of the ruins could not have been done with chips of the parent block or round hammer-stones. We had found no copper or gold or silver, no jade, no gums, no preserved grains, no cloth, no apparatus for weaving, and had discovered no pipe, and learned nothing of pre-Columbian smoking or tobacco.

A close examination of the potsherds showed a ware mixed with powdered limestone that reacted strongly under acid on the fractures. A smooth red make, strong, well baked, and symmetrical, and whose dull polished surface resisted the action of nitric acid, was abundant, while a very few fragments were decorated with brightly-colored designs, though their polish after the manner of a varnish yielded readily to the acid test. Many, though better baked than the ware of the Delaware Indians, were coarse. A very common hard variety had been striped with brown lines on a white or bluish ground. But there was nothing brilliant or striking about these fragments of dishes, cooking-pots, or water-jars. Few were ornamented, and only two or three highly so. None were marked or painted with hieroglyphs. Nevertheless a variety of tones, colors, and polish struck the eye when many sherds were laid side by side and brushed.¹

¹ Hoping that the process of the modern Indian might throw some light on the make and uses of the specimens discovered, and following the suggestion

But results more important than these had rewarded our close examination of the position and contents of the human rubbish

of Señor Maler, of Ticul, I spent a day at the suburbs of Merida in visiting a Maya pottery. Señor Escalante had kindly sent a clerk as interpreter, and we found the place after halting by mistake at another factory, where Mexican Indians were at work in their own fashion upon clay imported from Mexico.

On one of the small clay-floored thatched huts a woman sat on a low stool in the act of moulding a mass of light-brown clay placed between her bare feet, and which rested directly on a wooden disk three and a half inches thick, and four inches in diameter. Claspings the disk with her bare feet, the woman caused it to revolve on a smooth board with her toes and instep, while the clay, sticking fast to the top of the cylinder, turned with it and took regular shape against her fingers thrust down into the soft mass. Without suspecting it at the time, I was looking at a very primitive form of the potter's wheel, a device not heretofore supposed to have been indigenous to ancient America.

The Indian, whose wife did the invariable woman's work of moulding, was delighted to see us, and explained every step of the manufacture as here described. I took off my coat, opened my note-book, and began at the beginning.

THE RAW MATERIAL.

This was a hard white clay, dug out of the ground at Izamal, the best mine, where it contains very little iron; at Yokat, not so good; at Maxkanu, at Becl, at Muna, and at other places along the mountains, and resembling the *saccam* similarly dug for use as mortar. It dissolved immediately in water into a fine white paste. The Indian said that it contained too much lime to withstand glazing, for which purpose a dark imported clay mined at Orizaba in Mexico was used. The latter I had seen in the hands of the Mexican Indians at the other pottery.

PREPARATION OF THE RAW MATERIAL FOR MANUFACTURE.

As the clay when transformed into paste by water was not stiff enough for work, an alloy had to be mixed with it. The alloy used by this Indian was of two kinds: first, a fine white sand imported from Europe and rarely used by him, and, second, a powder composed of ground limestone obtained at the stone quarries near Yokat. Formerly this or similar stone had been pulverized by the Indian potters in stone mortars with stone pestles, but the specimens caked in lumps that I saw had been bought by the Indian when previously ground by machinery. To mix the alloy with the clay the water was poured off the vessel containing the white clay pulp; when the powder was sprinkled on dry and kneaded in with the hands until the composition was stiff enough for work. The proper proportion required judgment. Roughly speaking, the mixture was about half clay and half alloy.

MANUFACTURE.

To make one of the common water-cups, such as I bought, a round lump of the mixture, somewhat larger than a double fist, called *kat* in Maya, was stuck

heap everywhere present in the caves. Though this layer was the only culture-layer our digging had fairly proved at Oskintok,

on top of the solid wooden cylinder above mentioned, called *kabal* in Maya. This curious contrivance, three and a half inches high and four inches in diameter, rested upon a board, made smooth by soap, and placed as a work-table

FIG. 72.



The potter's wheel in Yucatan. Maya woman making pottery at Merida. The partly-formed jar sticks to the top of the *kabal*, which is made to revolve with her bare feet.

called *limia*, on the floor. The female potter, sitting on a very low stool, called *kanche*, took a piece of soap, *jabon*, and rubbed it on the middle part of the board. Then placing the cylinder, with the clay ball pressed fast upon it, upon the soaped and slippery spot, she seized the disk with her bare feet and by their motions caused it to revolve. As it slowly turned, carrying the

Loltun, and Sabaka, and though we had often failed to reach rock bottom at other caverns, there was nowhere ground for supposing

clay with it, she gouged the clay ball in the middle into a hollow with both hands, gradually throwing out the sides and making them stand up by pressure. The effect was that of a potter's wheel minus the regularity of outline given by swiftness of motion. In less than a minute the clay had taken the form of a flower-pot, and the woman proceeded to pare the rim even with a small wooden splint sharpened to a knife edge, called *cuchilla-cheh*. This flower-pot shape had to rest in the shade for about half an hour and set, while others were produced, at the end of which time it was ready for convexing or bulging out at the middle, a result produced with a small convex section of the rim of the calabash, called *box* in Maya, dipped in water contained in a dish called *lebrillo*. When pressed against the inner revolving sides of the cup, the calabash rounder transformed the flower-pot into the shape of an orange. The rim was now smoothed by pressure of a soaked piece of leather, called *keuel*, after which the pot was set aside to dry in the shade. Then after several hours of rest, and before it had become thoroughly dry, it was ready for

POLISHING.

For this purpose a white pebble, called *yulu*, which the Indian told me had been gathered on the sea-beach near Campeche, was rubbed hurriedly over the outside of the whole pot, giving it a dull polish, very inferior to that of the polished sherds from the caves. Not until the vase had become thoroughly dry was it ready for

PAINTING.

The only paint used by this Indian was red, and of two kinds: first, an imported powder bought by him at a hardware store in Merida, and, second, a less brilliant native red paint clay, called *kankab*, mined near Maxkanu, and probably solely used by Indian manufacturers in the country, but never used pure by this potter, who, considering it inferior to the imported powder, mixed it with the latter brighter color. A quantity of this mixed paint was liquefied with water in an earthen vessel (his paint-pot), and rubbed over the whole specimen with a rag. If Mexican clay from Orizaba were used another operation was possible, namely,

GLAZING.

The glaze, which had no name in the Maya language, called in Spanish *litarhillo*, consisted of an imported powder bought at a store in Merida and mixed with water into a paste of the consistency of thin cream. A thoroughly dry pot, having been heated about three hours in the furnace, was dipped in the glaze, which was floated about over its entire surface. Then the pot replaced in the hot oven remained there for three or four hours, until the glaze was seen to melt, at which point the fire was dampened and the vessel

that deeper digging or blasting would have upset our inference. An earlier people visiting Yucatan under its present topographi-

allowed to cool off in the waning heat for one day. The Indian informed me that the imported glaze would not work with clay containing lime, and, as all the native clays had this component, he said that all glazed pottery in Yucatan was made of foreign clay, generally imported from Orizaba, in Mexico. A point to be carefully considered in connection with the question of ancient glazing.

ORDINARY BURNING.

The oven of this Indian was made of bricks and mortar, in the shape of a beehive, about nine feet in diameter and six feet high, plastered on the outside and decorated with trowel slits and inlaid bits of stone in the Maya fashion. Inside, the vault was divided into two compartments of about equal size, the lower for the fire, the upper for the oven. To support the floor of the upper compartment six arches made of loose unmortared bricks, set side to side, were sprung across the inside of the structure. These arches left interstices about two inches wide between each other, which were bridged with potsherds after the whole series of spans had been stiffened by levelling in with brick. It was through the interstices that the flame reached the pottery resting above, while a small door closed with a loose tile, one loop-hole at the side, and a round opening at the top permitted graduation of heat and inspection of the progress of baking. The fire in the lower compartment was fed through a large door. Five to six hours' baking and a day's cooling sufficed to finish the pots, which were then ready for the market, and sold for ten cents each to Indians for use as water-dishes and drinking-cups of the porous kind, that kept the water cool through condensation of moisture upon the outside.

More investigation will be needed to decide whether the disk, the most curious feature of the process, is indigenous to America. I have not learned whether anything like it exists in Spain or among the Moors, where it should survive if the Spaniards brought it to Yucatan. The Maya name for it, *kabal*, "*Rueva de los Ollecos*," though indicating native origin, does not occur in the early dictionary of the Maya language published at the Monastery of Motul in 1576, but appears first in the later one of the Convent of San Francisco at Merida about 1690, for which reason Dr. Daniel G. Brinton, of the University of Pennsylvania, is inclined to date the word after the Spanish conquest. On the other hand, the Bishop of Yucatan, quoting the conservatism of the Indians, disputes the Spanish origin of the disk; and it seems difficult to suppose that the conquerors would have brought such a device with them without a name of their own for it, or that in such case the Mayas, who have called the soap *jabon*, would have dropped the Spanish word, whatever it was, and substituted for it their own term *kabal*.

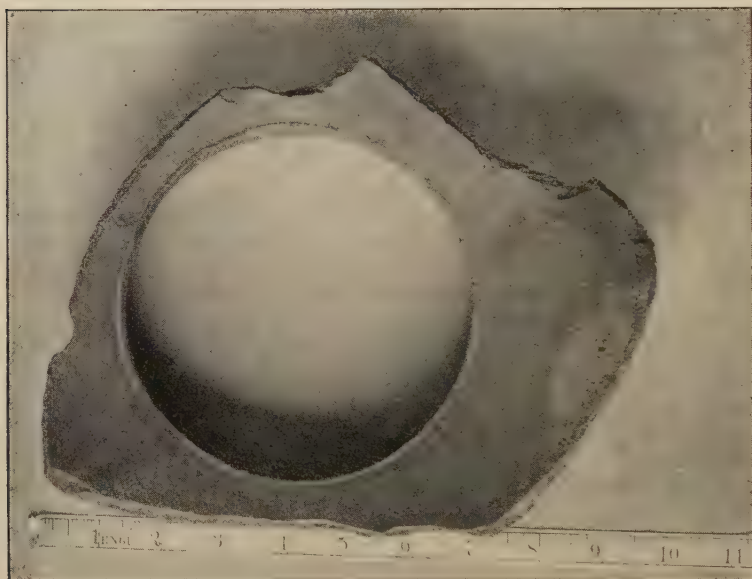
To infer the ancient existence of such a slow-moving wheel from the shape and texture of the potsherds found in the caves would be difficult. Most of the small sherds show nothing. In none are the curves geometrically correct, though in many the fairly even thickness, the superior regularity of the rims,

cal conditions must needs have left their trace in the caves, and because the undisturbed earth beneath the culture-layer discov-

and the parallelism of the surface scratchings suggest clay-turning upon the hand rather than the hand turning upon motionless clay. (See Fig. 73.)

That certain points of this process, the stool, the calabash, smoother and pebble, with their Maya names, might have been inheritances from the past seems probable, but some of the features are undoubtedly Spanish. The low polish on certain of the potsherds found had a vitrified appearance. But the assertion by the Indian potter that no native clay would stand glazing shows how completely he had forgotten the ancient art of glazing, if it ever existed,

FIG. 73.



Rim of ancient water-jar (reverse) with markings suggestive of potter's wheel. Chambak. Found on the surface.

while his purchase of foreign colors and his use of but one coarse native red hardly convey any suggestion of the means employed by the ancient potter to paint vases as we had seen them painted at Spukil and Loltun. No less must the oven itself fail to throw light on the past, for the brick arches are modern, and the shape itself involves a construction that the ancient Mayas did not appear to understand. Nevertheless we get suggestions of mines of clay situated in various parts of the Peninsula, of crushed limestone for alloy, of deposits of red paint dug from the earth, and of smooth pebbles searched for on the sea-beach, investigation of which may throw further light upon one of the greatest industries in ancient Yucatan.

ered always failed to show trace of any deeper, older, or more primitive human visitor, the conclusion was that no such earlier people had seen the region while its stony hills, its torrid plain, and its damp caves were as they now are.

The scanty animal remains have been kindly identified by Professor Cope as follows :

LIST OF VERTEBRATA OBTAINED BY MR. H. C. MERCER IN THE CAVES OF YUCATAN.

BY E. D. COPE.

In this list and the following list of mollusca the first number after the name of the cave marks the number of the trench in which the specimen was found, the subsequent numbers, unless indicated as layers, the number of the foot counting from the surface down. The letter A or B after the number of a foot refers to the upper or lower six inches of the foot.

Not Associated with Man. In undisturbed
Cave Earth beneath Human Culture-Layer.

Associated with Man.
In Human Culture-layer.

Batrachia.

Frogs, 2 species
(Loltun 3, Layer 4.
Chumul 2, 3, and 4.

Reptiles, 6 species.

Oxkintok 1, 7 B Iguanidæ, 3 species
(Chumul 2, 3, and 4.
Loltun 1, Layer 3.
Loltun 3, Layer 6.
Loltun 2, Layer 3.

Oxkintok 1, 7 B Colubrine snake
(Sabaka 2, 3.
Sabaka 1, 1 A.
Loltun 3, Layer 5.
Loltun 2, 3 A.
Loltun 3, Layer 4.

Oxkintok 1, 6 A Cistudo species
(Sabaka 1, 1 B.

Emys species

Aves, 9 species.

Meleagris.

Oxkintok 1, 7 B	{	 Six or eight other species of birds	{	Chumul 2, 1.			
Oxkintok 1, 6 B				Chumul 2, 3, and 4.			
Oxkintok 1, 14				Ch'ekt-a-leh 1, 1.			
				Ch'ekt-a-leh 1, 2.			
				Oxkintok 1, 5 A.			
				Oxkintok 1, 5 B.			
				Oxkintok 1, 4 B.			
				Oxkintok 1, 1.			
				Loltun 1, 3 A; Loltun 3, Layer 4.			
				Loltun 1, 3 B; Loltun 2, Layer 3.			
				Sabaka 2, 3.			
				Sabaka 4, 1.			
				Sabaka 2, 2.			
<i>Mammalia, 16 species.</i>							
Oxkintok 1, 6 A	{	Didelphys, large,	{	Loltun 2, 1 A.			
		Didelphys, small,		Loltun 2, 1 B.			
				Sabaka 2 (depth not determined).			
		Geomys species (gopher)		Sabaka 2 (depth not determined).			
				Oxkintok 1, 5 B.			
				Oxkintok 1, 5 A.			
				Oxkintok 1, 2.			
				Oxkintok 1, 1.			
				Loltun 3, Layer 6.			
				Loltun 3, Layer 4.			
				Sabaka 2, 2.			
Oxkintok 1, 7 B	{		{	Peromyscus, larger,	mice		
Oxkintok 1, Layer 4						{	Peromyscus, smaller,
Oxkintok 1, 6 A							
Oxkintok 1, 6 B							
Oxkintok 1, 14							

Oxkintok 1, 6 A.	Cervus (larger deer)	Chekt-a-leh 1, 2. Oxkintok 1, 3. Spukil 1, 2. Loltun 3, Layer 6. Loltun 2, 3 A. Loltun 2, 2 B. Lara 1, 1. Xmak 1, 1. Tiplamas 1, 1. Sabaka 1, 1 A. Chekt-a-leh 1, 2. Oxkintok. Loltun 1, 3 B. Loltun 2, Layer 3. Loltun 3, Layer 4. Xmak 1, 1. Sayab 1, 1. Sayab 1, 3. Chumul 1, 1.
Oxkintok 1, 7 B } Oxkintok 1, 6 A }	 Coassus (smaller deer)	

Total number of species of vertebrata, 33.

Man	Loltun 2, Layer 3. Sabaka 4, 1. Sabaka 2, 2. Sabaka 1, 1 B. Coyok 1, 1 B.
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As the table shows, a number of creatures had visited the caves before man came. Birds, rabbits, iguanas, snakes, weasels, and deer had found an early entrance into Oxkintok, and mice and rabbits had crossed its floor before the process began which deposited fourteen feet of cave-earth upon the bottom rock. A small rodent of undetermined family saw Loltun in the pre-Maya times. But the recognized species had continued their appearance in the human layer. Mice were common everywhere, whether as contributions to the cave-feast or not. The frog appeared only in Loltun. The peccary, still frequent in the region, was eaten at Loltun, Lara, Sabaka, and Sayab; the bear at Loltun; the deer at Oxkintok, Chekt-a-leh, Spukil, Loltun, Lara, Xmak, Sayab, and Tiplamas. At Loltun and Sabaka turtles and lizards were found edible; at Chekt-a-leh, Oxkintok, Sabaka, and Loltun, birds. Bats were mixed with the rubbish at Oxkintok, Loltun, and Sayab, and opossums at Sabaka and Loltun.

European horses must have been cooked and eaten in the caves of Sayab, Lara, and Chekt-a-leh since the fifteenth century, to account for the fragments of bone and teeth discovered there; for we find no reason for supposing that the people of Yucatan knew the American fossil horse, or scattered its remains in late portions of their culture-layers.¹

Horses could have walked into Lara and Sayab, where their teeth were found close to the surface. But in Chekt-a-leh the animal, which, like his relative at the other caves, had been cooked and eaten, must have been killed and brought in piecemeal or pushed over the side of the sink. At the latter cave the phalange, though found in the second foot, lay in a rubbish deposit so disturbed by down-faulting through funnel-like rock-fissures below that its original relation to the culture-layer was not certain.

The mollusca, kindly identified by Mr. Pilsbry, of the Academy of Natural Sciences of Philadelphia, were as follows:

¹ The horse molars and bones found by Mr. Mercer might, so far as their structural characters go, be referred to the *Equus occidentalis*, Leidy, which differs from the *E. caballus* in characters of the skull, while the molar teeth are closely similar. *E. occidentalis* is, however, found in association with a different fauna in the valley of Mexico and Western North America, and its bones are always fossilized, which is not the case with the specimens found by Mr. Mercer.—E. D. COPE.

The majority of the shells were found in Oxkintok Cave and in the layer of human rubbish. None were gathered in the undisturbed cave earth below that did not also occur in the disturbed zone of human interference above, except a small *Bulimulus* of undetermined species that still lives in Yucatan. The *Cyclotus dysoni*, Pfr., found on the rock bottom of Oxkintok at fourteen feet, was very common in the ash layers above, while, on the other hand, some shells found in the culture-layer, like the *Helicina fragilis*, the *Planorbis liebmanni*, the *Orthalicus princeps*, the *Streptostyla biconica*, and the *Glandina cylindracea*, did not occur below.

Some of the specimens may have been brought to the caves by the fire-builders, to be boiled or roasted for food or eaten raw; while birds and animals may have helped the distribution of many. Others again may have made their own way to the sites. The marine *Fulgur perversum* in Oxkintok at the third foot must have been carried to the cave from the sea-coast sixty miles to the westward.

Mr. Pilsbry writes me that "all of these species are now found living in Yucatan, and all but one (represented by a living specimen, *Streptostyla biconica*, from Mexico) were collected in the living state by the Expedition of the Academy of Natural Sciences of Philadelphia of 1890-91. A report describing them will be found in *Proc. Acad. Nat. Sci., Phila.*, 1891, pp. 310-334, with map and plates XIV. and XV. In no case have I been able to discover any differences between these cave specimens and the recent shells. The variations are exactly what are found in the living fauna."

Nevertheless, since he informs me that few important changes have taken place in mollusca since the Pleistocene period, and that, although certain species abundant then are nearly extinct or greatly restricted in range now (like the now rare *Helicina occulta*, once abundant in the Mississippi loess), no genera are extinct, there is little of value left for us in the evidence of the shells. Many out of a score of duplicates may have been ancient, many modern. The rare signs and variations betokening Pleistocene age that large lists of mollusca sometimes disclose were wanting in our small series; and the specimens gave no stamp of geological age to the human refuse.

Nor was there anything more definitely ancient about any of the animal remains. Some seemed positively modern, and, though many of the species may have existed in Pleistocene time, none had died out entirely. Where the cave-earth lay thick we were surprised, as we had often been in the United States, at the absence of the sloths, elephants, bears, or horses of an older time.

FIG. 74.



Cavern of Loltun. Indians working in Trench 1 on the floor of the main rotunda.

Why had their bones, so conspicuous at Port Kennedy, escaped us at Loltun and Oxkintok? If not in the human refuse, why had we failed to find them in the undisturbed earth below? Had the fossil remains of an earlier epoch washed out before the cave earth began to accumulate, or had they never collected on the cave floors? To explain their absence, we might suppose that the region had been unsuitably dry for the larger and clumsier mammals, or that many of the caves had been inaccessible to them, though the probability seemed that we had not dug at the right spots to reach fossil deposits. But, explained or unexplained, the point of the non-appearance of extinct animals in

the undisturbed cave earth had little bearing upon our result. It was their association with man, not their existence, that we sought, and there was no evidence anywhere in our trenches that man had ever killed, cooked, and eaten them.

The boundary-line that separates modern time from a last preceding epoch had not been passed, and the fossil proof of man's antiquity, so easy to find in Europe, was absent. Whatever we were to learn by deep digging into the undisturbed portions of the cave floors of Yucatan, the culture-layers were geologically recent.

No evidence was found to set apart the cave midden heaps as referring to a race or state of culture different from that represented by the relics discovered at the ruins. Though there was a disagreement between the texture of the ware from the mound of Xhemtzil and that from the caves, a fair similarity existed between the latter and that found in the cistern of Chumul. Pottery was an important guide. To unearth so great a variety of it everywhere, generally similar in make, texture, and polish to the specimens in collections from the ruins, and to find a carved ape's head at Spukil, wall-carvings at Ceh and Loltun, and flint knives and obsidian at the various underground sites, reasonably showed the cave visitor to have been identical with the Maya Indian who had built Chichenitza, Labna, and Uxmal. Further argument that the latter must have visited the caves to get water was hardly necessary. Under the circumstances it seemed impossible to refer the subterranean refuse to any one else.

Without venturing to weigh probabilities as to how long it would have taken a people reaching Yucatan in a rude state to develop the art of pottery on the spot, suffice it to repeat that no evidence of such development, whether of long or short duration, appeared in our trenches. Pottery grew rarer or disappeared altogether towards the bottom of the ash-films, yet there was no marked sign of evolution in the ware. The first immigrant, though coming lightly equipped with earthen vessels, must have already possessed the secrets of the craft. We found no Palæolithic man, no *Homo neanderthalensis*, no *Pithecanthropus erectus*, but a builder of cities, inferably the superior of most North American tribes when he appeared upon the scene.

In a word, we had taken the non-existence of cave evidence

like that of Europe as evidence in itself, arguing the absence of earlier man in the region from the absence of earlier culture-layers in the caves, and had inferred that the results obtained in the mountain caverns would apply to the whole northern Peninsula. That portion of the testimony was negative, and a single discovery of an earlier culture-layer at a cave unvisited by us will upset our inference. Nevertheless, when all things were considered we were satisfied. Everything indicated that we had gone directly to the heart of the question, eliminating redundant factors and noting facts where they were most significant; and, while experience with the country soon convinced us that primitive immigrants must have visited the hill-caves for water, we realized that surface pools liable to go dry in the dry season, like the *aguadas* at Zaccacal, Macoba, Bechanen, Uxmal, and Iturbide, the larger ponds north of Valladolid, or the more conspicuous open *cenotes*, like those at Chichenitza, could not have supplied the daily universal demand. If, moreover, from the first, dripping caves had been sought for and prized, there was no reason to suppose that the hill-caves had escaped the earliest attention of the water-seekers, or that any caves in the plain, as, for instance, those at Mayapan, or Bolonchen Ticul, or Kewik, or Xul, or Xcokh, described by Stephens, contained any conflicting or older evidence. We had done enough and seen enough to reasonably establish our conclusions:

First. That no earlier inhabitant had preceded the builders of the ruined cities in Yucatan.

Second. That the people revealed in the caves had reached the country in geologically recent times.

Third. That these people, substantially the ancestors of the present Maya Indians, had not developed their culture in Yucatan, but had brought it with them from somewhere else.

There was little to tell of our last few days in the *terra caliente*. The anxious care of a list of baggage, now swelled to about forty sacks and boxes, followed us to Merida, where several packages of tools and provisions had to be sold. After final purchases and visits to friends, came the expedition above noted to the pottery, a very interesting interview with the Bishop of Yucatan, and a pleasant dinner with our kind friend and hospitable host, Señor

Escalante. Then, hurried by news of an opportune steamer, we were again on our way to the sea.

As we stood at last on the pier at Progreso, it was easy to read in the faces of each member of the party that all had gone well, that what had been hoped for had been accomplished. Each had done his best, and all were going home together, with a regrettable exception. We were to say good-by to Pastor Leal, our Indian servant, who had come with us to the ship, bringing as a parting present a young oleander-tree in a wooden box. When he went away the long familiar background of Yucatan seemed to disappear with him, while mixed impressions of iron ships, railway tracks, shouting boatmen, and bales marked with well-known names took possession of our thoughts.

The English language rang cheerfully in our ears as we climbed down the greasy iron bulwark of a steamer into a tossing tug-boat, but all had become commonplace again, and nothing remained to astonish us upon the voyage but the coming change of climate. For, as weeks had passed, it had been easy to forget that a cold winter had raged at home. Nor, sailing the summer sea in finest weather, did we realize the paradox, until the sudden truth surprised us when we landed at New York in a snow-squall.

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